POWER

MID-DECEMBER, 1940

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NEW hydrofeed

Now . . . an electrically powered hydraulic drive for Westinghouse Single Retort Stokers that has the same operating characteristics as Westinghouse steam drive . . . controlled feeding rate, reliability and continuity of operation.

MEDIUM-PRESSURE oil from a gear pump actuates piston. Pressure is limited to the force required to move the ram, and automatically drops to almost zero between strokes. Oil reservoir is integral with cylinder. Oil pump unit may be integral with the Hydrofeed drive or placed elsewhere. One constant-speed electric motor may be used to drive both the forced draft fan and the oil pump, with independent control of fuel and air supply.

WIDE VARIATION IN COAL-FEEDING RATE—Infinite number of steps from zero to maximum provided by a timing valve which varies interval between strokes. Valve is set by hand or controlled by any standard regulator.

RAM OBSTRUCTIONS EASILY REMOVED—Ram can be reversed at any point by a hand reverse valve.

RELIEF VALVE limits oil pressure in case of an obstruction.

REDUCED WEAR—Drive piston and coal-feeding ram are direct connected, giving straight-line motion.

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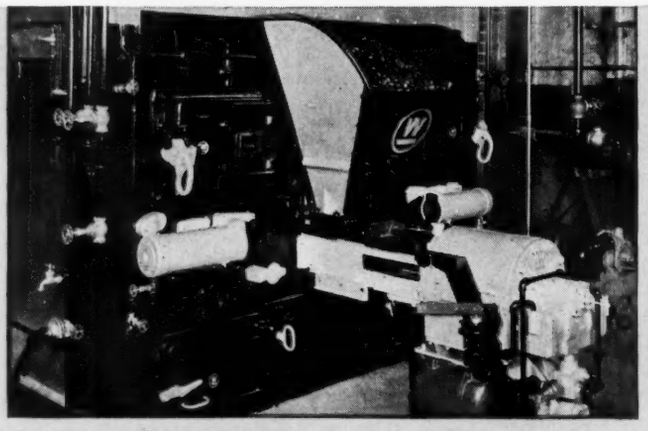
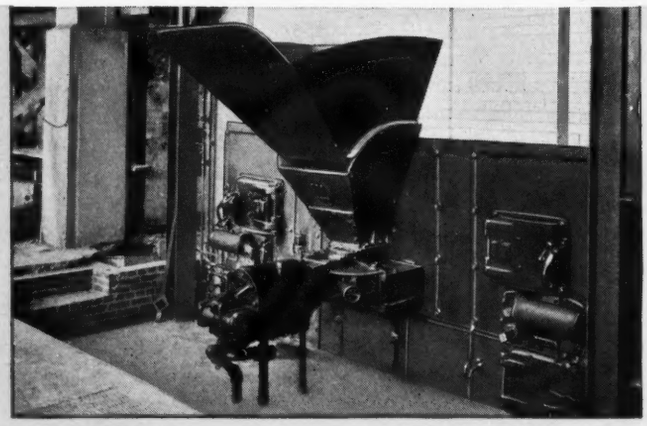


Stationary Grate Stoker with pump unit integral with Hydrofeed Drive and located in front of boiler.

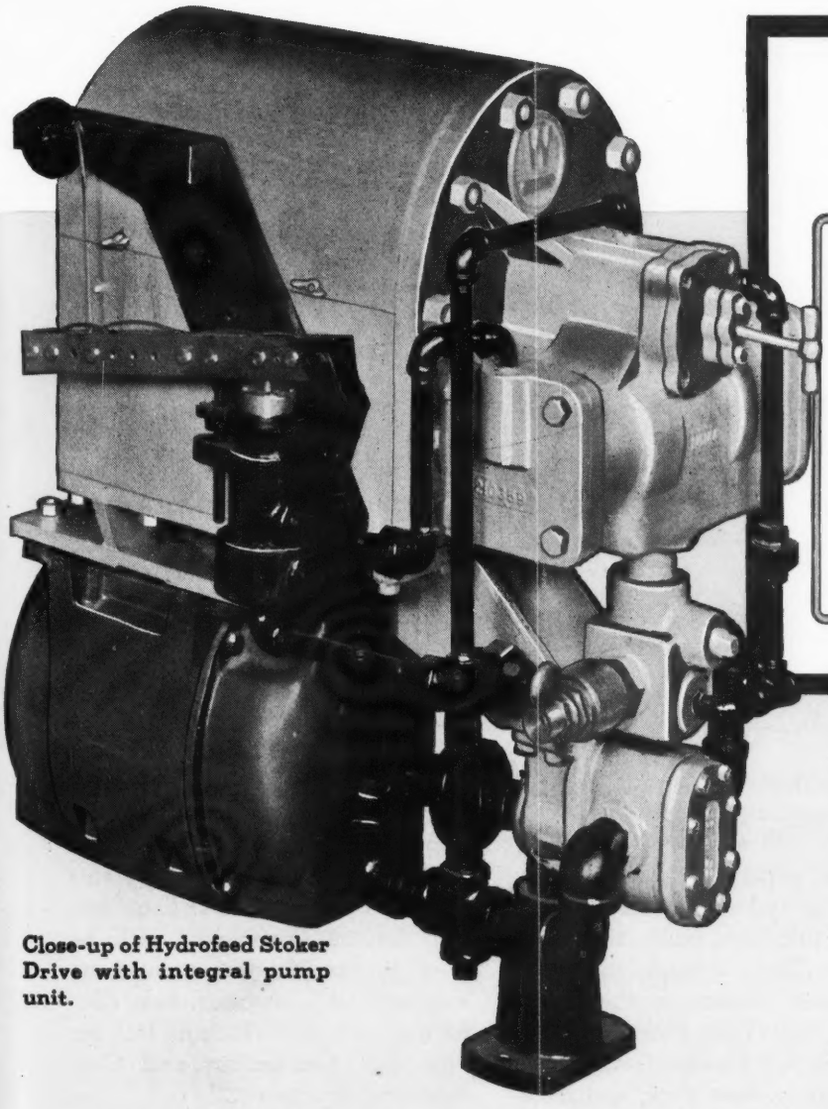


Link-Grate Stoker with pump unit for Hydrofeed Drive located at rear of boiler.

Westinghouse

drive

FOR WESTINGHOUSE SINGLE RETORT STOKERS



Close-up of Hydrofeed Stoker Drive with integral pump unit.

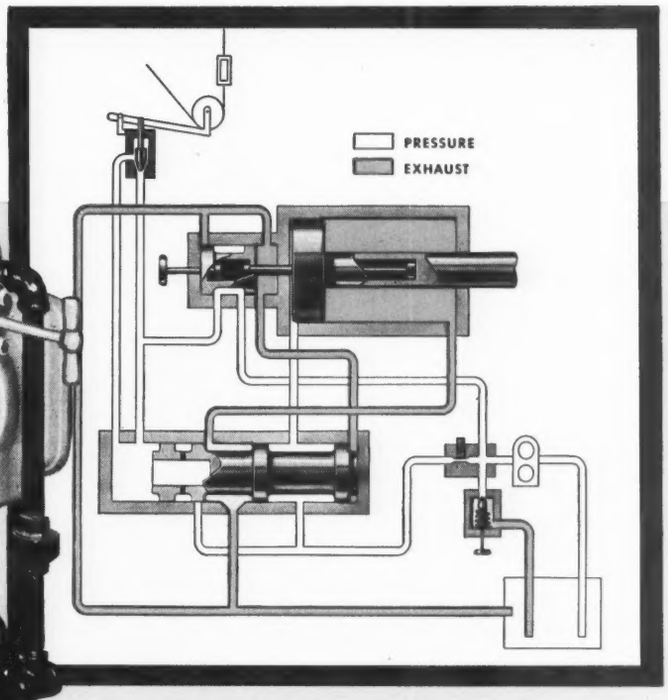
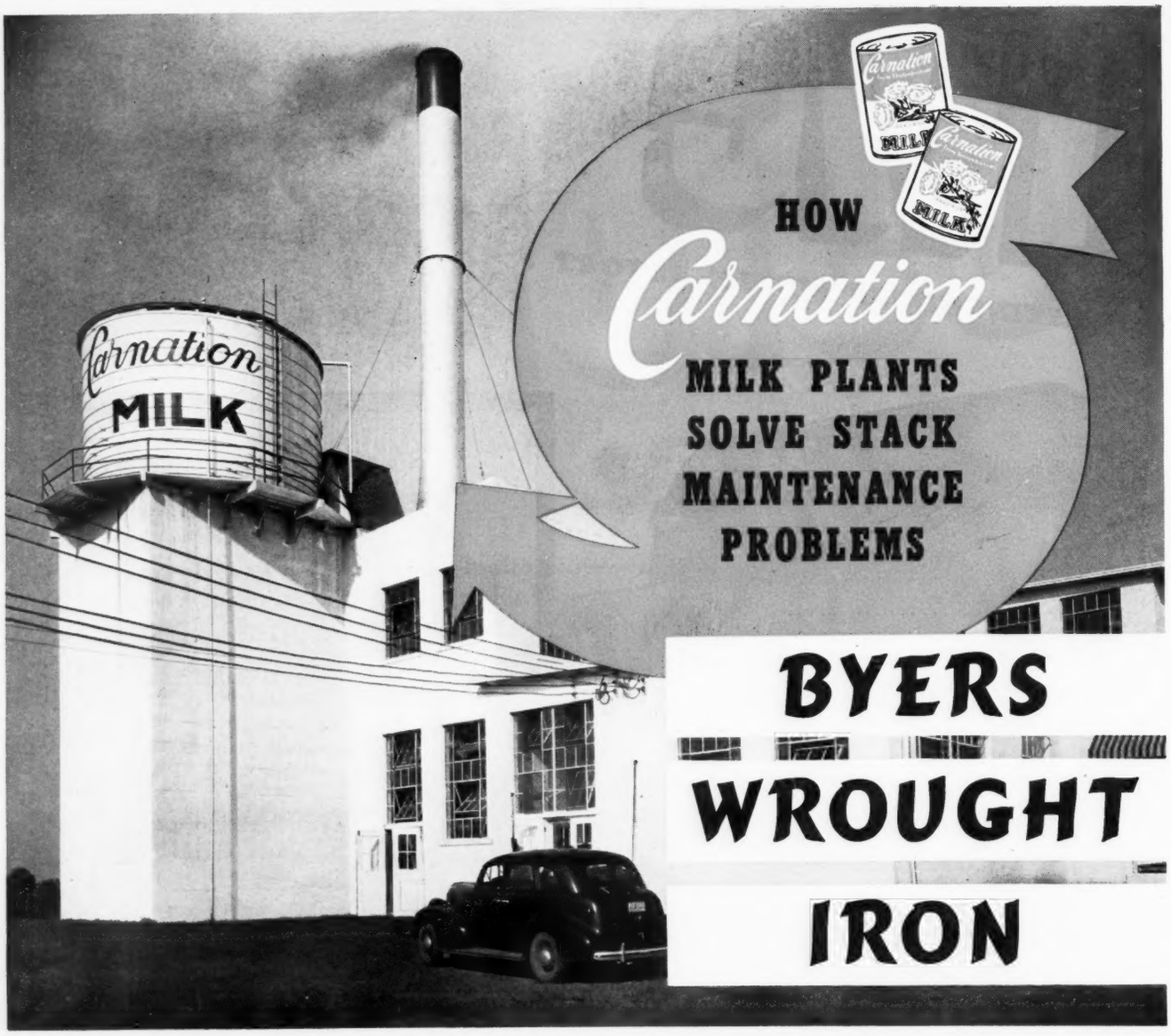


DIAGRAM SHOWING SIMPLICITY OF THE HYDRO-FEED DRIVE. SEND FOR DETAILED DESCRIPTION.

INVESTIGATE further how built-in improvements like Hydrofeed give you better combustion with Westinghouse Stokers. At no cost or obligation to you, ask your Westinghouse representative for complete information or write for Booklet 2196, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., Dept. 7-N.

SINGLE RETORT **Stokers**

W WESTINGHOUSE ELECTRIC



"From contented cows" to grocery counters, milk flows in a steady stream through the plants of the Carnation Company. Any interruption to processing operations may be costly, and so the engineers select equipment with especial care. In their new plant at Statesville, North Carolina, long and maintenance-free stack service was assured by using Byers Wrought Iron. In addition, all underground lines 2" and smaller—steam, water and air—are wrought iron. A wrought iron stack, similar to the one above, was installed at another new plant at Clarksburg, W. Va.

The company has a number of wrought iron stacks in use, some of which replaced stacks of other materials, and so can base selection on first-hand comparative experience. Three wrought iron stacks have been erected at the South Dayton, New York, plant, and one each at the Coshocton, Ohio, Cattaraugus, New York, and Hillsboro, Ohio, plants.

Stacks and breeching are a headache to many maintenance men. If your flue gas conductors require continuous maintenance and frequent replacement, it will pay you to find out the savings wrought iron has made and is making for other engineers in plants all over the country. Our Engineering Service Department will be glad to furnish you with some authentic case histories. Ask, also, for our bulletin, "Wrought Iron for Flue Gas Conductors and Coal Handling Equipment."

A. M. Byers Co., Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Chicago, St. Louis, Houston, Seattle, San Francisco.

Corrosion costs you more than Wrought Iron

BYERS GENUINE WROUGHT IRON

TUBULAR AND FLAT ROLLED PRODUCTS

STEEL TUBULAR PRODUCTS

POWER

Established 1882 • PHILIP W. SWAIN, Editor

Guide for 1941

Here is POWER's handbook for action in 1941, a year likely to surpass all others in military and industrial activity. More than ever before, steam and kilowatts, and all the power services, must go to work. America will demand the best efforts of the power engineer, and he, in turn, has the right to demand such practical help as this Buyers' Guide.

In the critical days ahead, the ability to make correct power decisions quickly will be all-important. To handle his job right, the engineer must size up the rapidly changing situation and see where equipment reinforcement is essential to carry the load, or highly desirable as insurance against a disastrous shutdown at the peak of defense activity. Then he must act both quickly and wisely.

This last is the rub. It is one thing to size up your present plant, quite another to line up and review all the things that might be done to improve it. Yet common sense tells us that wise decision and action is impossible until all the reasonable possibilities are laid on the table.

The pressing need of every active power engineer at this time is a complete summary of equipment possibilities. Hence this Second Annual Buyers' Guide, describing all the available new power equipment and engineering literature, and listing who makes what.

In a work of this sort, completeness is important. That is why 400 items of new equipment are pictured and described (page 56), 400 new catalogs and bulletins are reviewed (page 114), and manufacturers' names listed 5000 times under 400 product headings (page 161). These three sections constitute the engineer's handbook for the power decisions of 1941. Also, the progressive power man will want to get the slant of today's best thinking. He will find it in the ASME annual meeting report (page 91) and the Power Show highlights (page 87).

As far as we on POWER are concerned, this Mid-December number winds up 1940 and clears the decks for a still bigger and better 1941.

Review of Power and Mechanical Equipment

In the pages that follow, POWER *presents its thirteenth annual review of new and improved equipment. The 400 descriptions presented here are summaries of those which have appeared in* POWER *since January 1, 1940, plus additional items received in the past month.*

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BOILERS, STOKERS, TURBINES AND ACCESSORIES

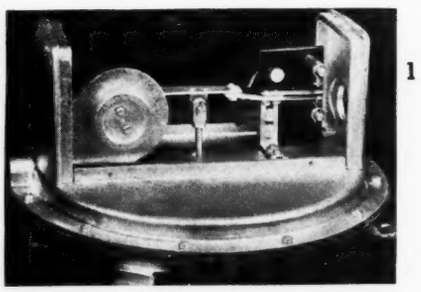
1 AIR AND GAS REGULATOR—"Statictrol" is low-pressure air and gas regulator for positive pressures, with enough capacity for gas- and air-duct control. Capacity is from 0 to 2 in. water-column pressure, and differential adjustment may be from .01 to 1 in. water-column pressure. Has eccentric adjustment for positive or negative pressures. *Automatic Control Co, 2590 University Ave, St. Paul, Minn.*

2 MOTOR BLOWER—Type G "Motorblower," for furnishing air to oil- and gas-fired furnaces, requires no special foundation. Built-in blast gate is in blower discharge and flexible pipe connections are provided for connecting either intake or discharge to shop piping. Unit available with discharge openings in any one of 8 positions, in steps of 45 deg. *Ingersoll-Rand Co, Phillipsburg, N. J.*

3 SMOKE ALARM—"Electric-Eye" smoke alarm with densometer makes photoelectric combustion control available to smaller power plants. Alarm consists of photoelectric control, densometer-signal combination, and light source and photoelectric control are mounted on opposite sides of flue or breeching, and aligned through tubes or windows so that beam from light source strikes eye of control. When smoke density exceeds certain limits, unit will flash red lamp, but normal density will register on densometer dial. *Photoswitch, Inc, 21 Chestnut St, Cambridge, Mass.*

4 AIR-GAS RADIOTROL — Air-gas units produce mixture of constant proportion, making both fluids interdependent while passing through an aspirator and an atmospheric regulator. Control valve has an adjustable port and has external bypass to furnish air to auxiliary diaphragm when control motor shuts off. Force from this diaphragm closes off all gas flow from burners at this point. *North American Mfg Co, 2910 E 75th St, Cleveland, Ohio.*

5 EXHAUST HEAD—Cochrane head said to insure separation of condensate and oil from steam discharged to atmosphere, at same time discharging steam noiselessly. Head incorporates principles of baffle type separators. Steam is whipped sideways after passing through port and causes projection of entrainment against ribbed baffle surfaces. High ribbed baffles exert a scrubbing action in addition to centrifugal pumping force. *Cochrane Corp, 17th & Allegheny Ave, Philadelphia, Pa.*



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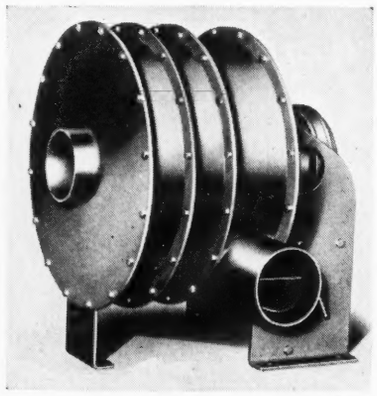

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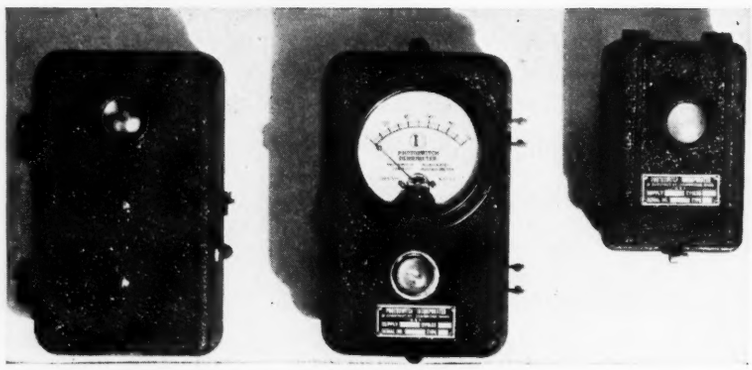

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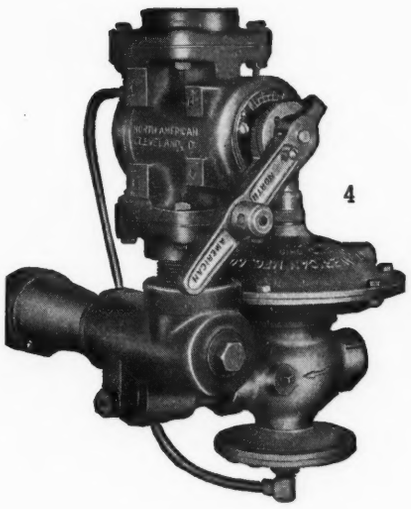

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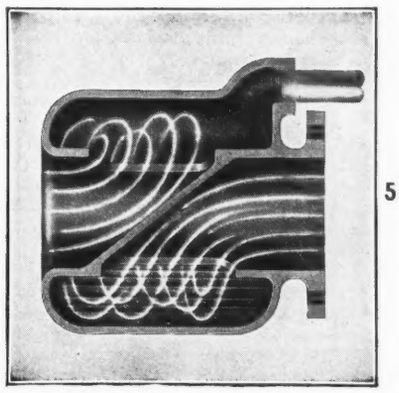

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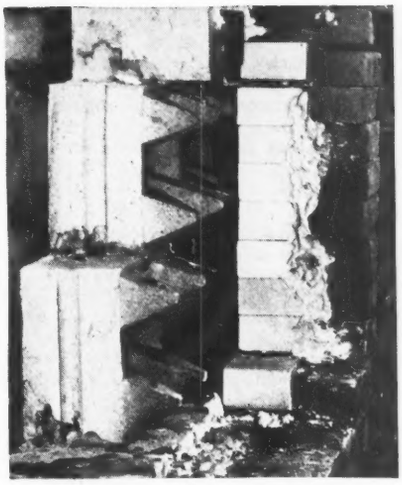

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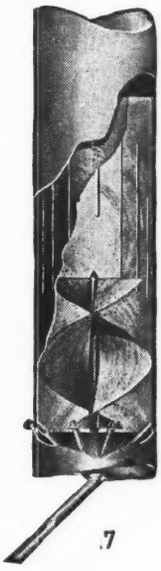

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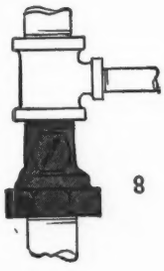

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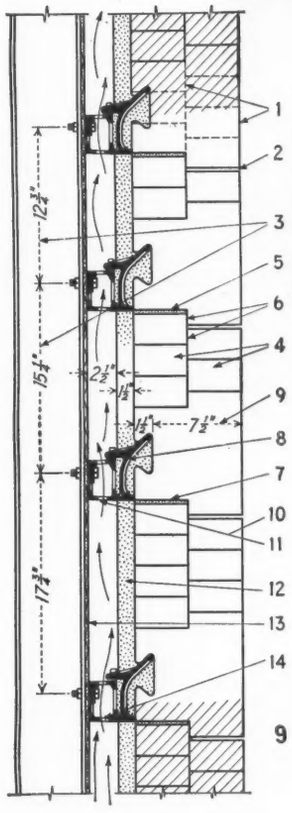

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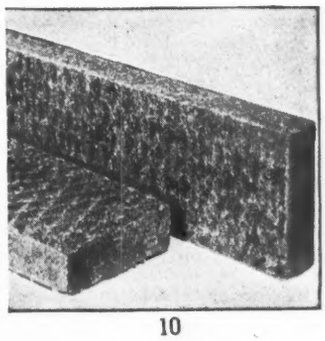

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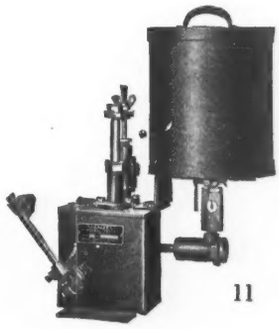

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6 AIR-COOLED WALLS — Pyramid type walls used for oil- or pulverized-coal furnaces consist of panels of specially designed refractory block having a group of pyramids on its rear face to increase cooling-surface area. Entire units are fitted with iron anchors and tie links, and are made up of two courses of blocks and one course of slotted header blocks, interlaid with standard 9-in. firebrick courses. *McLeod & Henry Co, 31 Monroe St, Troy, N. Y.*

7 FLYASH ARRESTOR—"Whirlex" flyash arrestor consists of double helix in lower part of dust chamber from 18 to 40 ft. high. Device is installed in chimney above breeching level so that there is a small space between cylindrical portion and stack. Flue gases passing through helix are given whirling motion and flyash, thrown to outside, passes through slots in dead space between cylinder and stack, falling by gravity through system of collecting pipes to ash holder. *Fly Ash Arrestor Corp, Birmingham, Ala.*

8 BLOWOFF MUFFLER—Centrifugal blowoff muffler said to eliminate disadvantages of blowoff tank. Blowdown, on entering inlet, sets up centrifugal action which separates sludge and water, and permits vapor to rise and drift out through vent. Swirling action keeps muffler clear of sludge and sediment. *Sullivan Valve & Engrg Co, 910 S Arizona St, Butte, Mont.*

9 INSULATED AND AIR-COOLED WALL—Is so designed that insulation can be placed between refractories and horizontal box castings, leaving 90% of wall-supporting metal outside insulation. (1) each tile is multiple of standard fire brick dimensions; (2) tiles and casting of each belt are separated; (3) heights of belts varied without changes in tile or castings; (4) 25 to 40% of all wall can be standard firebrick; (5) offset expansion joints, formed by notch in tiles, protect compressible packing; (6) notches in tile offset all brick joints. (7) No metal shoes or supports imbedded within refractories; (8) individual tile-supporting fingers protected by supporting tile; (9) greater refractory thickness in front of any supporting metal; (10) horizontal box supporting castings provides for lateral thrust; (11) horizontal box supports are spaced away from heated refractories; (12) as much as 1½-in. of insulation placed between refractories and box supports, preventing possibility of metal growth and opening of joints between refractories; (13) expanded metal lath and hard-finish coat conceals castings and gives neat appearance. (14) Venting concealed box casting prevents overheating. *Geo P Reintjes Co, 2517 Jefferson St, Kansas City, Mo.*

10 INSULATING BLOCK — B-H Mono block covers full range of temperatures up to 1600 F and is fabricated of B-H black rockwool, felted and bonded together, easily cut and fitted around equipment having curved surfaces as well as flat. Made in lengths from 18 to 36 in., widths from 6 to 12 in. and thicknesses from 1 to 4 in. *Baldwin-Hill Co, 575 Klagg Ave, Trenton, N. J.*

11 CHEMICAL FEEDER—Compound feeder is for injecting quantities of compound into boiler water as it enters boiler. Operation is automatic, amount fed being adjustable. Only part of feeder coming in contact with compound is small, single-plunger pump. This is outside feeder body so that repairs and adjustments can be made without dismantling feeder. *Manzel Brothers Co, 326 Babcock St, Buffalo, N. Y.*

SILICA REMOVER—"Silimite" is special form of activated lime containing magnesia, said to be effective in removing silica from hot process softeners. Calcium content of lime is used in softening, while other constituents are effective in silica removal. Silimite is slaked in accordance with definite procedure. Slaked Silimite and soda ash are then introduced into softener and operation is carried on in same manner as with normal water-softening process. *Allis-Chalmers Mfg Co, Milwaukee, Wis.*

FEEDWATER CONTROLLER—New principle used in this controller. Small stream of water is fed into control tube at its hot end, increasing valve motion through changing temperature of entire tube by positive volume control. In addition to maintaining precise control of boiler feedwater, this controller, with accelerator attachment, permits blowing control tube without throwing apparatus out of adjustment. Small filter is incorporated in line between tap-in on feed and accelerator valve, and back wash is provided, through which filter can be washed and freed of scale. Controller can be equipped with either whistle or electric alarm so that if boiler pump fails or pump packing becomes lodged under valve, warning will sound. *J A Campbell Co, 645 East Wardlow Rd, Long Beach, Calif.*

1 DEAERATING SYSTEM—Acker system deaerates water fed to boilers. Navalbronze female trunnion receives direct support from bearing unit composed of two split bearings cast integral to insure alignment, and located in center of rocker section, thus carrying full load of tilting mechanism. *W M Acker Organization, Inc, 3167 Fulton Road, Cleveland, Ohio.*

2 STRAINER SYSTEM—Double-check strainer system to prevent loss of zeolite obtains better water distribution, increases capacity of water softener and permits use of larger amount of zeolite in softener of given size. Slotted strainers in lower manifold permit free flow of water to service line, yet prevent escape of zeolite material. *Elgin Softener Corp, Elgin, Ill.*

3 ANTHRACITE STOKER—Iron Fireman Series 35 commercial anthracite stoker is designed for high- and low-pressure steam boilers, hot-water boilers, and for industrial applications. Coal is burned on reciprocating grates which gradually move burning coal from retort to ash pit. Electric controls regulate stoker in accordance with load requirements. *Iron Fireman Mfg Co, 3295 West 106th St, Cleveland, Ohio.*

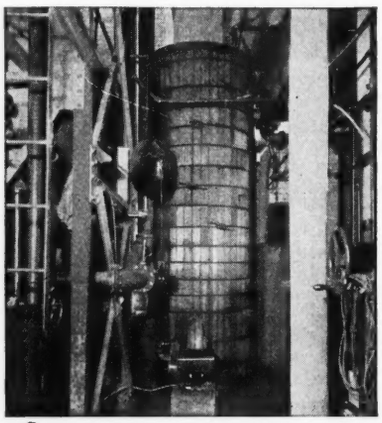
4 DETECTOR FOR BOILER TUBES—Sperry unit is supplied on rental basis, and is supervised by company engineers. Equipment is table mounted, including amplifiers, energizing and detector coils, drive rolls and controls. Can be operated separately from tube construction, giving advantage of being able to test different size tubes. Automatic control stops tube movement at each defect signal. Defects may be visible to the eye or invisible, external or internal. Calibration of equipment permits sensitivity according to size of defects to be detected. *Sperry Products, Inc, 1505 Willow Ave, Hoboken, N. J.*

5 DECARBONATOR—Cochrane decarbonator for degasification is used to remove CO_2 from effluent of carbonaceous-hydrogen-zeolite softeners and from water supplies treated with acid. Constructed mainly of redwood, unit is equipped with rotary blower and fitted with corrosion-resistant metals. *Cochrane Corp, Philadelphia, Pa.*

6 PROPORTIONING FEEDER—Model B feeder employs Haering principle for proportioning liquids into liquids or gases and operates on pressure difference between pitot tubes. Improvements in new model include use of flexible steel tubing on pitot tubes and cross lines to take up stress and shock of water hammer and slight misalignments due to curling of welded connections, and check valve is now installed on needle valve line where it prevents reagent from backing into line. *D W Haering & Co, Inc, 2306 S Winchester Ave, Chicago, Ill.*

7 STOKER—Whiting unit is adaptable to all coals from lignite to anthracite. Moving steps or grates have reciprocating motion which causes coal in hopper to progress uniformly across grate. Performance guarantee includes following: (1) smokeless operation to conform to local ordinances, (2) capacity up to 50 lb of bituminous coal burned per hr per sq ft of active grate surface, (3) CO_2 content of not less than 12% at center of gas stream through furnace exit or at end of flame shall be maintained when operating at or above a combustion rate of 15 lb per sq ft grate per hr, and (4) combustible in ash shall not be more than 25% of weight of ash. *Whiting Corp, Harvey, Ill.*

8 OVERFEED STOKER—Multiple "Fyr-Feeder" has few, slow-moving parts, and "Spray-Spred" firing method. In operation, coal is drawn mechanically from large hopper to inclines inside furnace. Coal then rolls down these inclines into air streams under light pressure. Thus, coal is cleaned and coal dust is sprayed and instantly burned in suspension by air which sprays it. Balance of coal is spread along length of forced-draft



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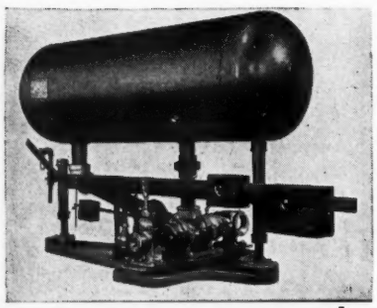

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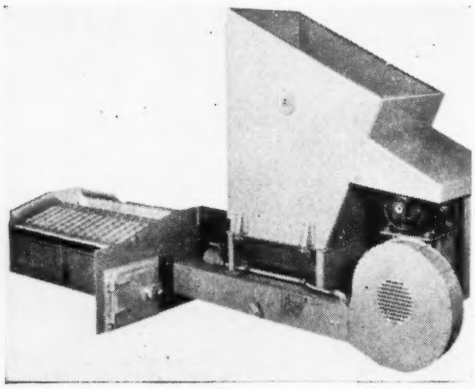

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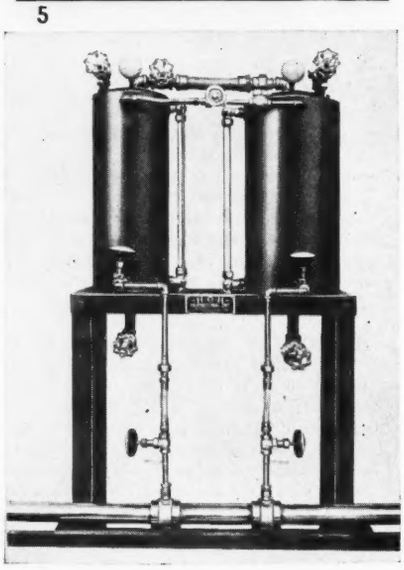

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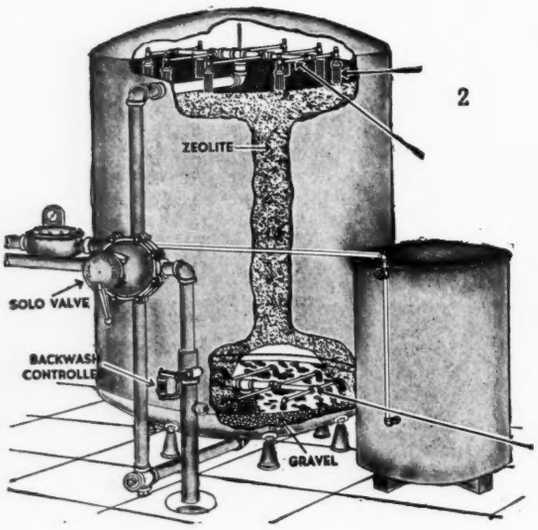

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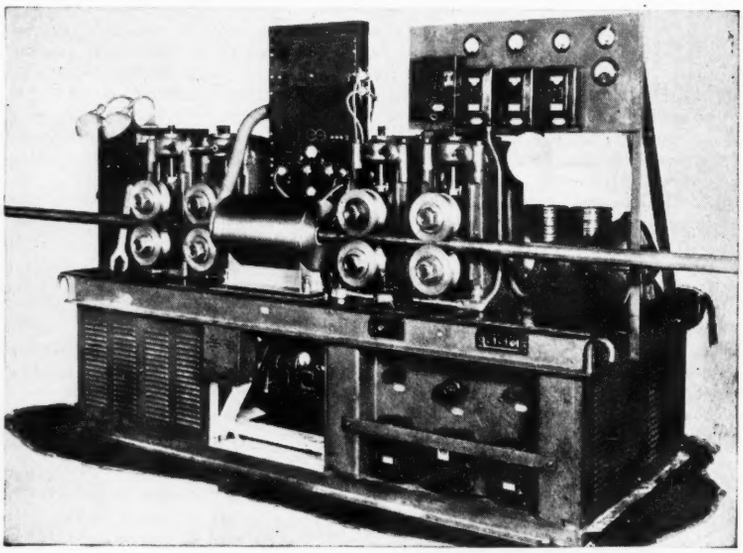

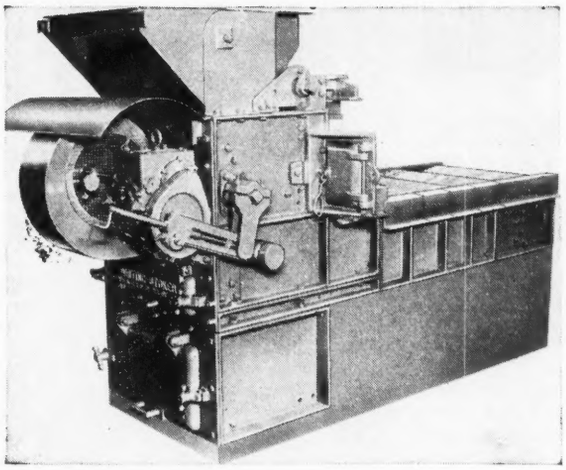

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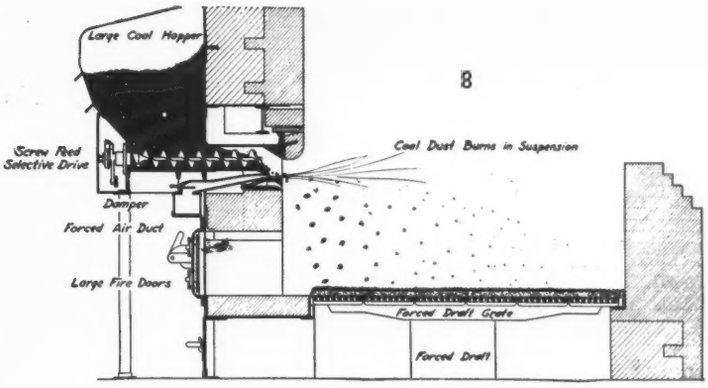

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grate according to weight-size of each piece. Capacity of each unit varies according to size and speed and will deliver and "Spray-Spred" up to 500 developed horsepower per unit. *American Coal Burner Co, 155 East Superior St, Chicago, Ill.*

9 UNDERFEED STOKER—C E Low-ram stoker unit has been designed to burn either coking or non-coking bituminous coals. Forced-draft fan, fitted with vortex-type inlet damper, and direct-connected to stoker-drive motor, is integral part of unit. Main ram feeds coal from hopper to 1-piece retort extending full length of furnace section; and rear of retort, although supported by rear end frame, is free to float to allow for expansion. *Combustion Engineering Co, 203 Madison Ave, New York, N. Y.*

10 BOILER-FEED SYSTEMS—Westco automatic boiler-return systems designed for boilers up to 1500 sq ft heating surface and 200 lb pressure. Systems are said to return automatically all condensate to boiler from both high- and low-pressure systems, and make-up water as needed to compensate for loss of live steam, maintain a uniform water level in boiler, keep return lines constantly open, eliminate backpressure on return lines, and feature low-cost operation. *Micro-Westco, Inc, 104 State St, Bettendorf, Iowa.*

BLOCK INSULATION—L-W Superex is furnished in both block and pipe-covering form, and is suitable for use in industrial furnaces, flues, stacks, etc, where insulation will be subjected to temperatures between 600 and 1500 F. *Johns-Manville, 22 East 40th St, New York, N. Y.*

INSULATION—Firefoil is insulating material with characteristics of structural material. It is made of alternate layers of flat and corrugated-asbestos felt joined with new waterproof adhesive. For use in boiler casings, oven walls, linings for stacks, etc. *Philip Carey Co, Lockland, Cincinnati, Ohio.*

SCALE PREVENTER—"K.A.T." is used to prevent and remove scale formations in water stills and evaporators, according to maker. Said to prevent foaming and entrainment, and promote pure distillate. Works with all waters and requires no chemical water analyses except to determine hardness. *American K.A.T. Corp, 122 East 42nd St, New York, N. Y.*

SILICA REMOVER—Permutit process for removing silica from boiler water makes use of silica-absorbing property of metallic-oxide sludges. Water being treated is brought into intimate contact with high concentrations of sludge, thus assuring maximum silica removal. *Permutit Co, 330 West 42nd St, New York.*

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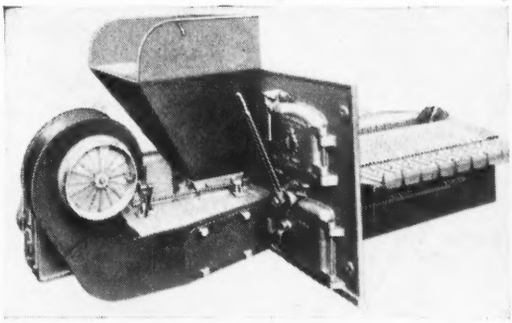

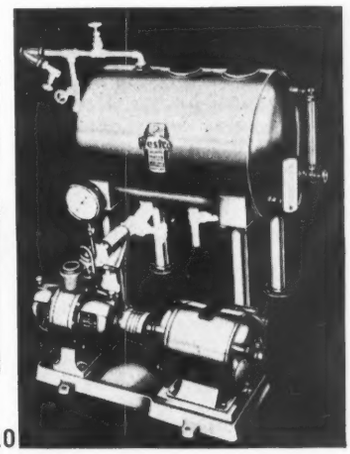

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COMBUSTION CONTROL — "Robot-Eye", photoelectric combustion control, controls flow of air into furnace, so that fuel-air ratio is maintained to produce slight haze in flue gases and therefore keep combustion at highest practical efficiency. Draft regulator maintains furnace draft within predetermined limits, but if draft so established does not maintain fuel-air ratio required to produce desired flue-gas haze, then electric eye, through its compensating system, increases or decreases draft setting just enough to establish desired haze. *General Power Plant Corp, 512 Fifth Ave, New York, N. Y.*

SILICA REMOVAL—Adsorption process, utilizing "Remosil" (specially prepared magnesium oxide), which reduces soluble silica in any natural water to a fractional part per million while actually reducing rather than increasing total solids in water. Silica is removed in hot-process softeners; no expensive equipment is required. Among features claimed are that process, using only one chemical, permits addition of lime for softening operations when needed, entirely independent of any magnesium requirements for silica control. Patents applied for. *W H & L D Betz, 235 W Wyoming Ave, Philadelphia, Pa.*

COATING—Surface treatment designed to prevent or minimize corrosion or "furring" of boilers consists of a coating which may be applied by dipping, brushing, spraying, etc, and which hardens when exposed to light. Basic ingredients are colloidal graphite, electro-positive metallic filler, a hardenable organic colloid, and hardening agent for colloid, suspended in water. Composition may be applied at normal temperatures, or, if faster drying is desired, at around 100 C. *Acheson Colloids Co, Port Huron, Mich.*

BOILER—"Hi-Test" boiler operates at 125- and 150-lb pressure and can be fired with any fuels liquid, solid, or gas; hand or mechanical fired. Has Cop-r-loy tubes as standard equipment, and tube layout provides for free unrestricted water circulation sweeping steam bubbles from heat-transmitting surfaces so a steady water line is maintained. *Kewanee Boilers Corp, Kewanee, Ill.*

REFRACTORY—"Thinsulite" is combination of refractory, insulation and suspended tile principle. Advantages claimed are low costs for materials, light weight, low heat loss, permanent heat and air-tight construction and low maintenance cost. *M H Detrick Co, 140 S Dearborn St, Chicago, Ill.*

INSULATING FIREBRICK—K-16 brick made of special Georgia kaolin said to maintain structure, show negligible shrinkage, and withstand loading without deformation at temperatures up to 1600 F for direct exposures and 2000 F for backing up. *Babcock & Wilcox Co, 85 Liberty St, New York, N. Y.*

FUSIBLE BOILER PLUG—Rockwood fusible plug is made of high-grade bronze, with cores filled in with Banca tin. Plug may be conveniently removed, when either filled or fused, by hitting side with hammer, collapsing it. This disengages plug threads from boiler and plug can then be pulled out easily. *Rockwood Sprinkler Co, 38 Harlow St, Worcester, Mass.*

BASE-EXCHANGE RESINS — Company announces acquiring of rights to U. S. patents of Department of Science and Industrial Research of London, England, on use of synthetic resins as acid and base-exchange compounds discovered several years ago by Dept on Water Softening Processes. If removal of only metal ions is required, cation, or base-exchange resins can be used. Similarly, acid-exchange resins can be used alone for removal of acid ions. In general, combinations of both are used. *Resinuous Products & Chemical Co, 222 W Washington Sq, Philadelphia.*

COMPRESSORS

1 COMPRESSOR—Model X-8 is single-stage, duplex-cylinder compressor having piston displacement of 8.7 cfm at maximum speed. Cylinder and crankcase have been cast in one piece, and crankshafts are drop-forged, heat-treated steel. Lubrication is constant-level splash-type, while cooling is accomplished by deep horizontal fins on cylinder. Valves are mounted on head and each can be removed from body for inspection without disturbing others. *Quincy Compressor Co, Quincy, Ill.*

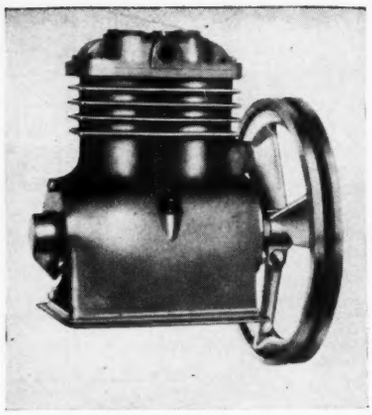
2 PORTABLE AIR COMPRESSOR—Empire portable units are small compressors used to supply air for paint-spraying purposes. Model 4 has 4 cylinders, and model 2, two. Units are cooled by fan-blade type of flywheel and by fins in cylinder block and air conditioning unit. Air-cleaning chamber filters the air and removes impurities. Valves are stainless-steel disk, heat treated and rust resisting. Largest unit gives 3.7 cfm at 60 lb. *Empire Compressor Mfg Co, Reading, Cincinnati, Ohio.*

3 AIR COMPRESSOR—Supplementing present line of large compressors, Type Q is used for small services, such as diesel starting, etc. Units have cushioned air valves, tapered roller main bearings, Lynite connecting rods, semi-steel pistons, automatic starting being optional. Available base-mounted, bare or tank-mounted, for V-belt drive from motor or air-cooled gasoline engine. Units for diesel starting have combination motor and gasoline drive, so arranged that belt can be shifted easily to gasoline engine in case of power failure. *Sullivan Machinery Co, Michigan City, Ind.*

4 SELF-PROPELLED COMPRESSOR—Eliminating power take-offs, extra compressors and trailers, power unit will replace standard Ford engine in truck. Combination engine and compressor can be operated by truck driver from cab. Supplies 55 cfm at 100-lb, and is standard full-size Schramm air compressor adapted for truck installation. Basically, unit is 4-cyl engine and 4-cyl air compressor in an 8-cyl block. Power cylinders are Nos. 1 and 4 in one bank and Nos. 2 and 3 in other to give equal power and load. When operated as truck, four power cylinders drive it through standard clutch, compressor cylinders being shut off so that no power is consumed or air compressed. *Schramm, Inc, 758 East Virginia Ave, West Chester, Pa.*

5 AIR COMPRESSOR—Compressor is stationary model of Fordair compressor (see No. 4, above). Stationary units are complete with built-in cooling systems, electric starting system, including battery, starter controls, starter motor and battery generator. Units can operate on gas rather than gasoline if necessary. *Schramm, Inc, 758 E Virginia Ave, West Chester, Pa.*

6 AIR-HOSE REEL—Developed for use with portable and stationary air compressors, units are made so that three ft, or entire 50 ft, of hose can be pulled from reel and valve then opened, allowing air to enter. Valve is self sealing, with no adjustments or packing, and no stuffing boxes. Reels can be obtained in two styles. One has flat sides for wall mounting and for concave air tanks; other has one flat side and one concave side to fit over convex-end air tanks. Illustration shows unit with flat sides. *Schramm, Inc, 758 East Virginia Ave, West Chester, Pa.*



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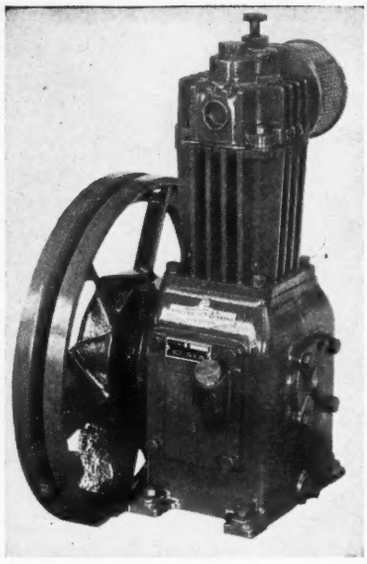

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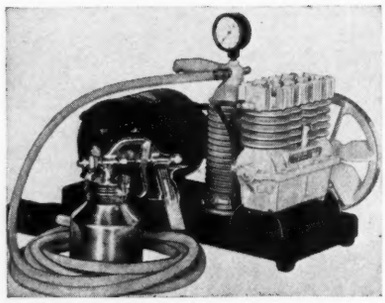

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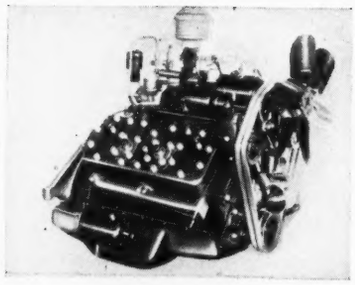

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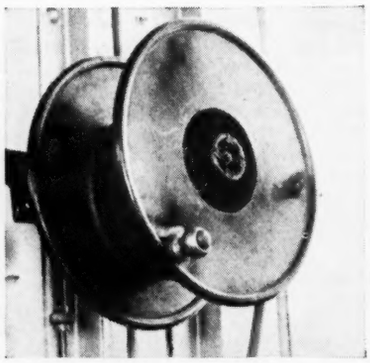

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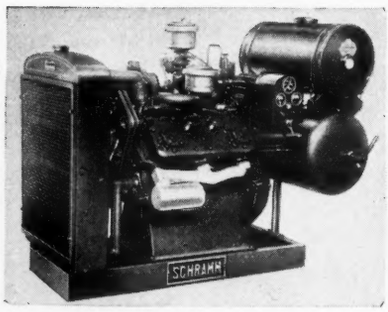

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SAVE THIS ISSUE!

It contains the following useful data that will serve you throughout 1941:

1. Review of the year's new equipment
2. Resumé of the 1940 Power Show
3. ASME Annual Meeting report
4. Brief reviews of over 400 pieces of engineering literature
5. Directory of power equipment and supplies — your guide to where and what to buy

DIESELS, GAS ENGINES AND ACCESSORIES

1 SPRING ISOLATOR—Working parts of J-M controlled-spring isolator consist of coil spring and rubber load pad, which support equipment and isolate vibration, and adjustable rubber snubber inside base, which controls excessive motion. *Johns-Manville, 22 East 40th St, New York, N. Y.*

2 TWO-CYLINDER DIESEL—"Dix" series, 2-cylinder diesel has all important features of larger sizes. Largest model in series develops 27 hp at 1600 rpm. All models built primarily for hand starting, large flywheel and decompression device built into cylinder facilitate starting. Fuel pump and governor are incorporated in design of cylinder block. Engines have only three gears in front of engine, these being crankshaft, camshaft, and lubricating-oil driving gear. Time-gear housing, tappet and rocker-arm compartments are airtight and sealed from crankcase. *Hercules Motor Corp, Canton, Ohio.*

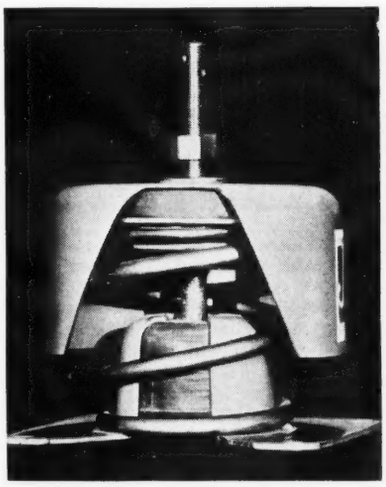
3 DIESEL ENGINE—Type JS 4-cycle engine is made in 5, 6, 7, and 8-cyl units rated at 430, 525, 600 and 675 hp respectively at 400 rpm. Crankshaft is one-piece, 9-in. dia steel forging. Main bearings are babbitt-lined steel shells with shim adjustment. Eight piston rings used, five compression, three for oil control, with one of latter below piston pin. Individual cylinder heads are bolted to cylinder-block top. Main valves seat directly in cylinder heads. Cooling-water header is cast integral with cylinder block, underneath air-intake header and on exhaust side of engine. Cooling water passes from cylinder heads by individual elbow connections to exhaust-manifold jacket. Fuel system is patented Cooper-Bessemer atmospheric-relief type, and fuel injectors are mounted on camshaft-housing cover, and are gear driven from camshaft. *Cooper-Bessemer Corp, Mt Vernon, Ohio.*

4 COOLING CONTROL—Type TR-40 for engine and compresor jackets, condensers and degreasers, is used for throttling flow of fresh cooling water, allowing only enough to flow to cooling system to maintain desired water-outlet temperature. Unit is fixed-stem type, requiring discharge from jacket or coil to be close to inlet. Bulb is installed vertically in enlarged section of water-discharge line, as close to machine as possible, and with water flowing upward. Maximum working pressure is 150 lb. Regulators are calibrated at factory at any desired temperature and can be adjusted 25 deg above or below factory calibration. *Sarco Co, Inc, 183 Madison Ave, New York, N. Y.*

5 ANTI-VIBRATION UNIT — "Vibro-Isolator" consists of steel springs housed by special channel irons with flat steel plates at top and bottom. Pressed-steel cups hold springs in correct position. Adjustment bolt passes through leg or sub-base of machine to be isolated, fastening it securely to upper steel plate. This bolt then makes contact with tension plate resting on springs to hold machine and provide for alignment before and after installation. Studs from upper steel plate pass through oversize holes in top flanges of side channels and are held in desired position by self-locking nuts. Contact between studs and side flange is eliminated by suitable isolating material. Holes are furnished in lower steel plate for anchoring entire unit to foundation. *Korfund Co, 48-15 32nd Pl, Long Island City, N. Y.*

6 DIESEL-ELECTRIC SET—"Powr-Pak" line of diesel-electric power plants consists of radiator-cooled engine, generator and control panel, assembled and ready to operate. Units range in size from 3.5 to 24 kw. Chief change from conventional design is placement of generator directly beneath engine, cutting floor space requirements. Lister 4-cycle diesel is prime mover. *Lister-Blackstone, Inc, Milwaukee, Wis.*

7 GAS ENGINES — Single-cylinder, slow-speed, type Z engines available in four sizes with cylinder displacements of 118, 208, 346 and 503 cu in. Line incorporates several features, including vapor-phase cooling; renewable valve seats; oil-impregnated, bronze-bushed valve guides; roller bearings; controlled-splash lubrication; and internally-mounted governor operating in oil bath. In vapor-phase cooling system, condensing radi-



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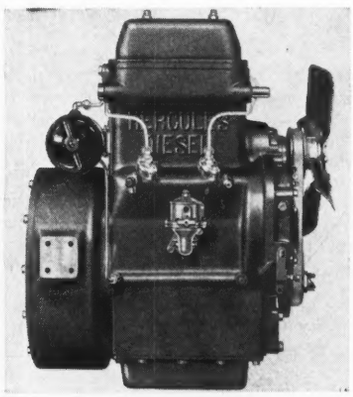

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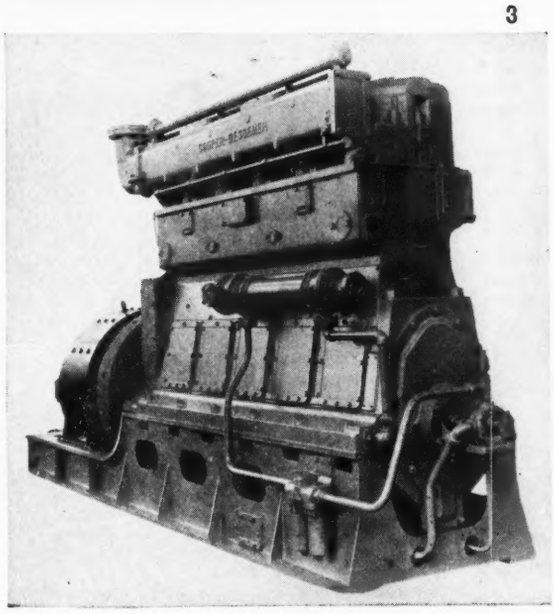

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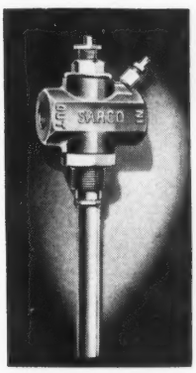

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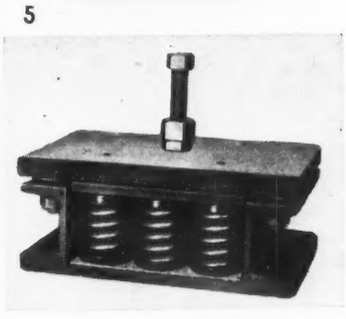

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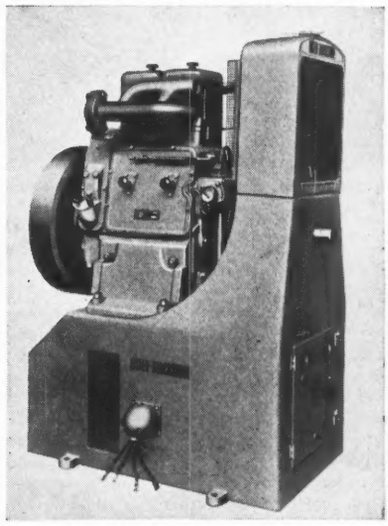

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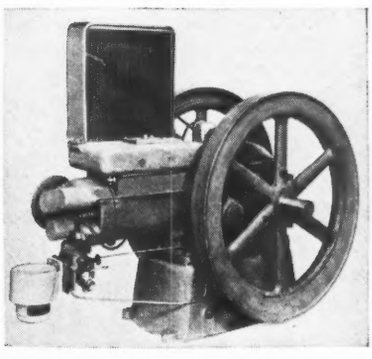

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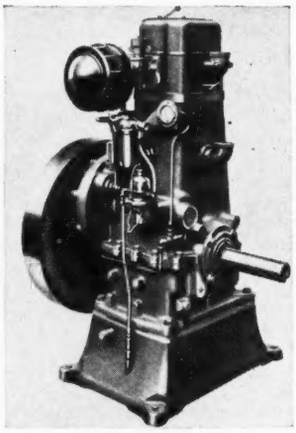
ator is mounted directly on top of cylinder. Steam generated from water expands into special chamber and enters radiator. Air forced through radiator by cooling fan condenses this steam to water, which is then returned to system. Thus engine temperature is held constant, regardless of load or outside temperature. Engine is available in combinations with electric generators, pumps, compressors, etc. *Fairbanks, Morse & Co, 600 S Michigan Ave, Chicago, Ill.*

ENGINE CUTOUT—Safety device is designed to protect stationary internal-combustion engines by interrupting operation if lubricating-oil pressure drops dangerously low, or if cooling-water temperature rises too high. Available in two models, one with manual and other with automatic reset. For engines with distributor-type ignition, device is wired to break circuit on temperature rise or pressure fall. For engines with magneto-type ignition, opposite terminals are used which short circuits primary of spark coil to ground. For diesel engines, device is set up to control a solenoid valve installed in fuel line to injection system. *Minneapolis-Honeywell Regulator Co, 2747 Fourth Ave, South, Minneapolis, Minn.*

DIESEL ENGINE—4 cyl, 36-40-hp unit is of enbloc construction with replaceable wet-type cylinder liners. Main bearings are heavy-duty babbitt lined steel shells. Spiral-gear-driven accessory shaft is mounted on roller bearings, and all heavily pressed steel parts are of alloy steel. Cylinder head contains pre-combustion chamber, intake and exhaust valves and fuel-injection nozzle. Crankcase is ventilated with forced-feed lubrication to cam and crankshaft bearings and forced-flood lubrication to gears. Oil-bath air cleaners, fuel and oil filters are regular equipment. *Witte Engine Works, Kansas City, Mo.*

POWER UNITS—"Simpac" power units are self-contained ac generators, with integral exciters, instruments, voltage regulators and control. Units are driven by gasoline or diesel engines. Dc exciter is mounted on fabricated-steel shelf above generator and is driven off generator shaft extension by V-belts. Control, regulator and meters are enclosed in sheet-steel cabinet fastened to one side of generator frame. Ratings from 3.75 kva to 187 kva are available with voltages of 120/208, 240 or 480 volts, with operating speeds from 600 to 800 rpm. All units come wired and assembled. *Westinghouse Electric & Mfg Co, East Pittsburgh, Pa.*

DIESEL ENGINES—Engines said to develop more power per cubic displacement and to be smoother running and more economical to



operate. 7½- and 10-hp models are single cylinder, see photo, and 15- and 20-hp models are twin-cylinder type. Illustration shows standard stationary mounting. *Stover Engine & Mfg Co, Freeport, Ill.*

HEATING, VENTILATING, REFRIGERATION AND AIR CONDITIONING

1 CONTROL SYSTEM—Unit control system provides modulated continuous flow of steam whenever necessary, quantity of steam flow being dependent on demands of thermostat; continuous automatic fan operates only when steam is being supplied to unit heater; manual "off-on" switch permits fan to be run constantly, or if no heat is required it may be shut off. Optional feature is means of shutting off fan automatically where there is no pressure in main steam line. System may be pneumatic, as illustrated, or electrically operated. *Minneapolis-Honeywell Regulator Co, 2747 Fourth Ave S. Minneapolis, Minn.*

2 VENTILATING BLOWER — "Rexvane" vent sets are centrifugal fans with direct-connected motor. Feature is radial-blade fan rotor said to permit higher rotative speeds, lower outlet velocities, and more dependable balance when handling air containing grease or solid particles. Cone-shaped inlets guide entering air to rotor with minimum shock and turbulence. Rotor consists of eight blades, each curved into inlet in direction of rotation. Curved portions of blade are banded together by a broad hoop which strengthens rotor and broadens path of entering air. *B F Sturtevant Co, 47 Readville St, Hyde Park, Boston, Mass.*

3 TEMPERATURE CONTROL — Differential temperature control is designed for use with maker's forced-circulation hot-water heating system. Unit said to balance outdoor and indoor temperature in single or groups of industrial buildings. One bulb is placed outside and other inside, and, when heat is necessary, control automatically operates other mechanism such as oil burner, to start production of more heat. *H A Thrush & Co, Peru, Ind.*

VARIABLE PITCH FANS—Said to show fuel economies of more than 10%, variable-pitch fans on some types of internal-combustion engines operate on principle of maintaining most efficient engine operating temperature under load and weather conditions. Thermostat on air or water jacket causes variable-pitch fan-blades to move into correct position for necessary air movement to reach this temperature, which is then automatically maintained. When cooling is not required, further economy is said to be effected, because blades flatten out and take no power. Only adjustment is through thermostats, and maker claims that through having only one place for adjustment life of fan belts is increased. *Kontrol-Fan, Inc, Pasadena, Calif.*

STRIP HEATERS—Designed for operation at sheath temperatures as high as 1200 F, heaters are enclosed in porcelain-enamel steel casings. Units said to substantially reduce replacement costs in heavy-duty applications due to corrosion resistance. *General Electric Co, Schenectady, N. Y.*

FANS—"Teardrop" propeller has permitted widely increased application of company's adjustable pitch fan, according to maker. New propeller is said to provide economy in power consumption even when both speed and blade pitch are changed to give exactly amount of air desired. *Hartzell Propeller Fan Co, Piqua, Ohio.*

4 AIR-CONDITIONING CONTROL—"Modutron" system can be applied to any refrigeration installation using thermostatic expansion valves with customary external equalizer. Small electrically-operated valve is in-

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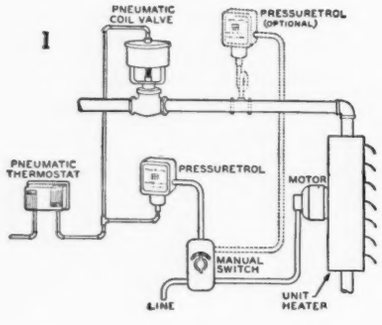

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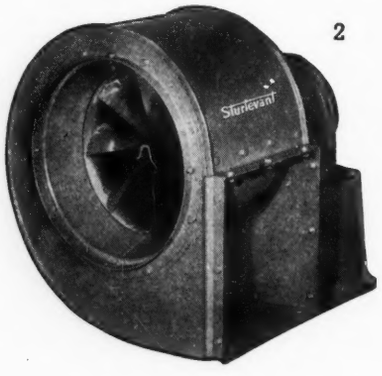

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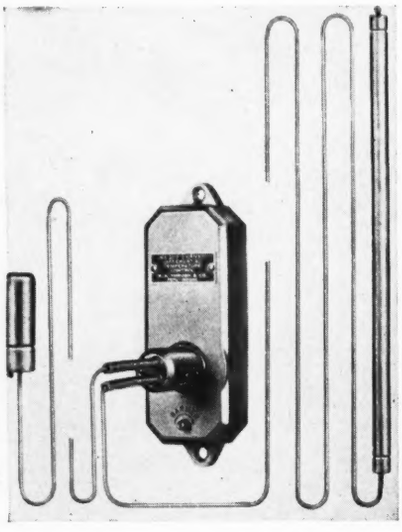

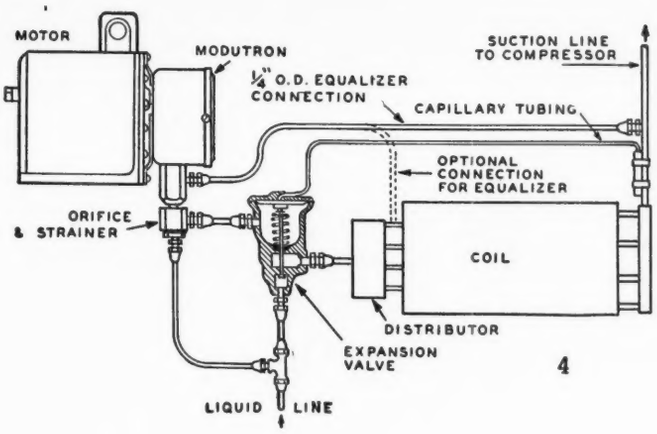

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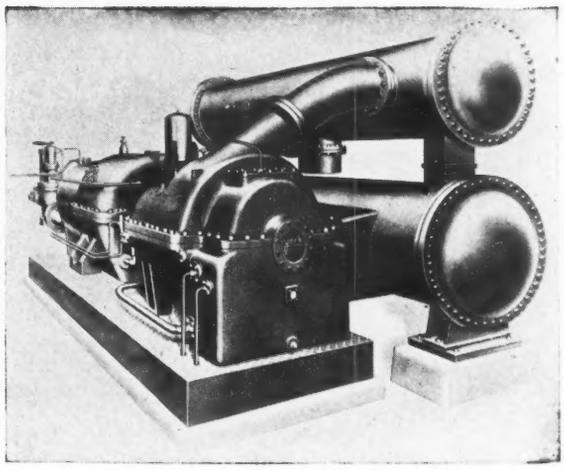
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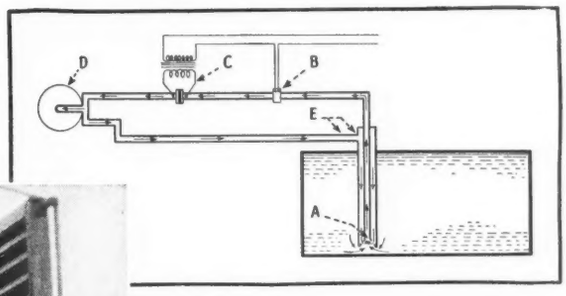

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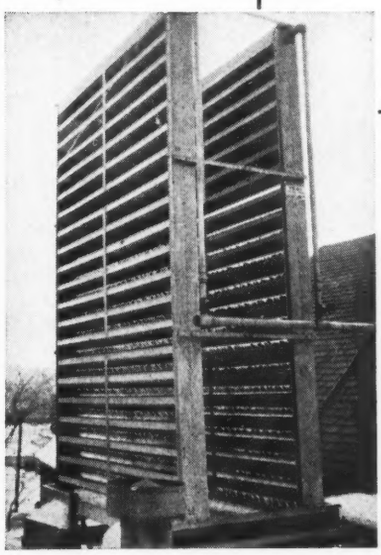
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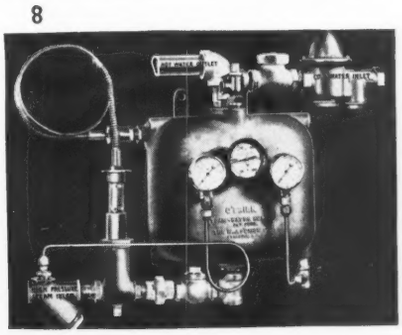
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stalled in equalizer line of expansion valve. Electric motor which operates valves is modulated by temperature, humidity, pressure or other condition to be controlled and opens valve wide when maximum cooling is desired. If less cooling effect is needed, electric motor moves valve to more closed position, reducing effect of external equalizer on expansion valve. Since inlet pressure to coil will be higher than outlet pressure, expansion valve is then affected by a higher pressure than when system is wide open. This is due to pressure drop through distributor and coil. *Minneapolis-Honeywell Regulator Co, 2747 Fourth Ave, S, Minneapolis, Minn.*

5 TURBO-COMPRESSOR—New line of refrigerating turbo-compressors marked entrance of company into field of equipment to supplement its line of vertical reciprocating compressors, particularly in places where steam-turbine drive can be efficiently applied. Compressor can also be motor driven. Standard systems available from 150 to 1000 tons of refrigeration. Applications will include large air-conditioning systems for comfort or process—also water- or brine-cooling systems for manufacturing plants. Refrigerant is trichloro-monofluoromethane or "Freon 11". Turbo-compressor is said to be so free from vibration that it can be mounted on upper floors or light foundations. Features include impellers operating at low speed, "balance-disk" compensation of impeller thrust, and bladeless diffuser vanes for reducing pumping limit. Condensers are non-ferrous internal construction. Accompanying water-cooler is of flash-type, non-ferrous construction, with hermetically-sealed liquid pumps. With steam-turbine drive, refrigeration is controlled by turbine speed. *York Ice Machinery Corp, York, Pa.*

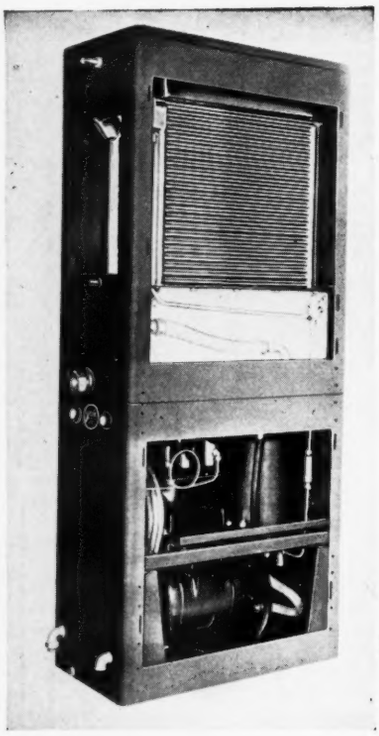
6 OIL HEATER—"Lines" thermal electric conduction system for heating viscous fluids makes entire piping system long heating unit. Basic parts of system are heavy-duty transformer, electrically insulated tank head with suction and return outlets, and thermostat. Special transformer at *C* in illustration, supplies electric energy to make piping a long heating system, heating entire line of flow, so that oil, entering at *A*, is continually being heated as it flows to *D*, point of use. Proper temperature is maintained by thermostat at *B*. Surplus oil is further heated as it returns through *E* to point of suction *A* and is redrawn into system. *Albert G Purdue Associates, 303 Wooster St, New Haven, Conn.*

7 COOLING TOWER—Tray towers are made in atmospheric and mechanical-draft types for indoor and outdoor application. Composed of slotted-step-type trays. Water, on leaving header, is continuously broken up through slots. Long travel over trays keeps water in suspension as long as possible until it reaches tank. This effects cooling of water to a point very near wet-bulb temperature. Units are all steel, with open distributor header, no nozzles, and with slow-speed blowers. *New England Cooling Tower Co, 791 Tremont St, Boston, Mass.*

8 STEAM-AND-WATER MIXER—Hot water, in amounts up to 3000 gals per hr, is furnished by industrial injection-type steam and water-mixing unit. Only three connections necessary: one to coldwater line, another to high-pressure-steam line and third to hot-water outlet. Other features listed by maker are: easily accessible clean-out plugs, temperature and pressure-relief valves, single-seated steam-control valve, and provision for tempering inlet water, and recirculating mixer water. *W J O'Brien Co, 205 Harrison St, Syracuse, N. Y.*

9 FANS—"Buffalo L Breezo" is for applications where propeller-type fan is needed, but where motor must be out of air stream. Motor, V-belt pulleys, and one bearing are entirely outside of path of air being handled. Units designed to operate against a head as high as 1½-in. static pressure. Housings are so made that air inlet may be at top, bottom, or either side of unit and may be changed from one to other if necessary. *Buffalo Forge Co, 488 Broadway, Buffalo, N. Y.*

COOLING TOWER—New line of cooling towers has been developed to offer low-cost water-cooling while retaining most of features of design, operation and construction of larger models. Throughout wide range of sizes all towers are shop-fabricated so that no pieces require any further fitting or drilling. Parts furnished have only to be bolted together, the units being shipped knocked-down. Only three pipe connections required to put unit in operation. These are to spray header at top, one to automatic make-up float valve in basin and another from return outlet. Frame,



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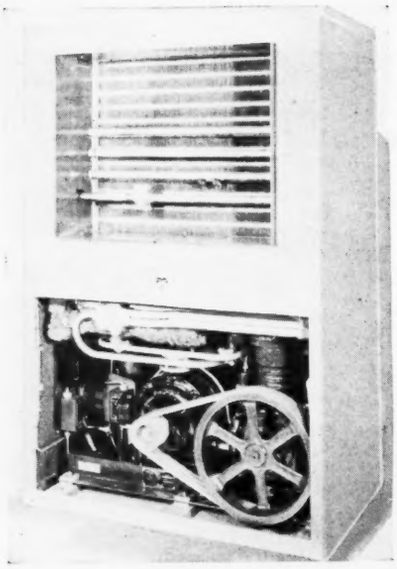

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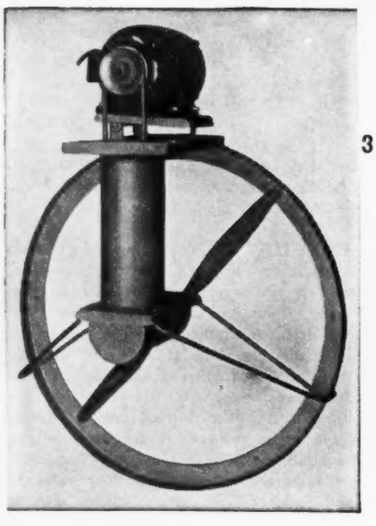

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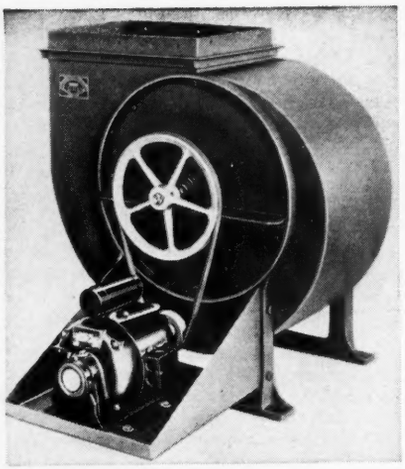

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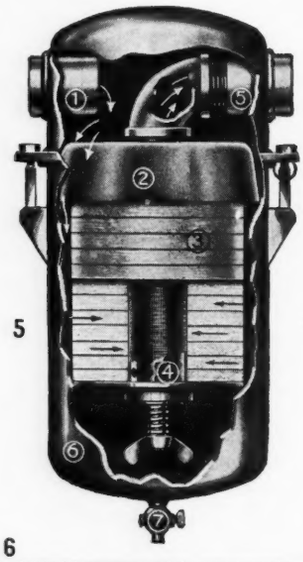

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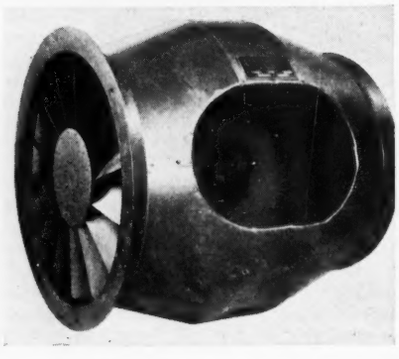

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posts and louvre boards are of heart California redwood. Louvre boards are "slip-fitted" into position and held without nails or bolts so that access to interior is always permitted without tools, and so boards may expand and contract without frame stress or warping. *Marley Co, Fairfax Rd & Marley Ave, Kansas City, Kansas.*

1 WATER COOLER—Smaller than York "High K" stainless-steel plate water cooler, new "Cold-Well" cooler, in 3- and 5-hp models, is designed for small-scale industrial operations—notably bottling. Temperature-selector dial is set for any desired uniform temperature from 34 to 50 F. To insure sanitation, stainless steel is used for entire water circuit —distributor, cooling plates and reservoir. Refrigeration is supplied by York unit in base. Cooler is package-assembled in modern-style cabinet, charged with refrigerant and tested before leaving factory; supplied in four models: light-duty, 3 and 5 hp; heavy duty, 3 and 5 hp. *York Ice Machinery Co, York, Pa.*

2 BOOSTER-TYPE CONDITIONER—Originally developed for installation in industrial air-conditioning system where more cooling was needed than a certain duct was able to deliver at times, booster-type conditioner is installed as integral part of duct. Lengths of pipe extending across face of finned coil, see cut, are provided for superheating gas before it reaches compressor. If it is impossible to install unit in duct, bypasses can be supplied to send part or all of the air through coils of the booster. *Frick Co, 325 Broadway, Waynesboro, Pa.*

3 PROPELLER FAN—For use where motor must be outside air stream, unit is built in sizes from 17- to 28-in. propeller diameter. Employs Charavay overlapping ring, said to insure high efficiency by preventing back flow of air at propeller tips. Motor base is welded to this ring and also to a shield which encases belt. Propeller-shaft bearings are completely enclosed. *Hartzell Propeller Fan Co, Piqua, Ohio.*

4 UNIT BLOWER—"Autovent" blower, instead of being direct-connected, is belt-driven, and maker claims many advantages from this arrangement. Some of these include: versatility in regard to motor size, greater portability, and wider adjustability. Consists of uni-blade Type H blower operated by standard-frame motor equipped with suitable V-belt drive. Motor is mounted on steel pedestal base built integral with blower housing. *Autovent Fan & Blower Co, 1805 Kostner Ave, Chicago, Ill.*

5 AIR FILTER—Model AAPHS air filter provides for complete removal of slightest traces of oil from compressed-air lines. Disks (3) said to possess large absorption area with good filtering efficiency. These are of Feltex and are carried in tube composed of inner liner of perforated metal covered with a fine-bronze-wire mesh screen. Tube (4) helps to drain oil removed from the air to bottom of filter shell (6). Lower portion of filter shell is removable for cleaning and inspection by loosening wing bolts (8). Additional construction details are deflector cup (2), intake pipe (1), outlet (5) and drain cock (7). Direction of air travel indicated by arrows. *Staynew Filter Corp, Rochester, N. Y.*

6 COOLING TOWER—Features of "Double-flow" tower include fact that hot saturated air is not recirculated, unit has low pumping head, and is lower in size than conventional-type tower. Unit has special cast-iron hardware, and negligible drift-moisture loss, according to maker. Also has patented eliminators, requires less makeup and chemicals, has high efficiency, and has external water-distribu-

tion system, removable bronze nozzles, and Marley propeller-type fans. *Marley Co, Fairfax Rd & Marley Ave, Kansas City, Kansas.*

7 VENTILATING UNIT—"Bifurcator" is designed to remove corrosive, toxic, high-temperature and hazardous fumes. Consists of axial-flow pressure fan mounted in patented housing with motor set in separate built-in chamber, isolated from air flow. Can be installed as integral part of duct without directional change in air flow. Available in sizes from 8 to 48 in. *DeBothezat Ventilating Equipment Div, American Machine & Metals, Inc, East Moline, Ill.* (See cut, page 64)

1 ODOR ADSORBER—Improved portable model of adsorber uses principle of ordinary gas mask, that is, positive-extraction principle of air-odor removal. Unit uses adsorption medium of granular cocoanut-shell carbon. Has one moving part, electric motor which draws foul air in and delivers pure air back to room. Adsorbent carbon is said to hold more than 20% of its own weight in odors, and under normal conditions will keep high efficiency for several years, after which it may be replaced. *Dorex Air Conditioning Div, 116A East 32nd St, New York, N. Y.*

2 FAN-TYPE HEATER—"Hi-Jet" vertical-shaft propeller-fan-type heater projects air through heating element with sufficient velocity to direct heated air to working level. Heating elements provide features such as expansion bends and patented stay tube. Provided in two models, one for high-ceiling location, with high velocities, and other for low-ceiling installations. *Herman Nelson Corp, Moline, Ill.*

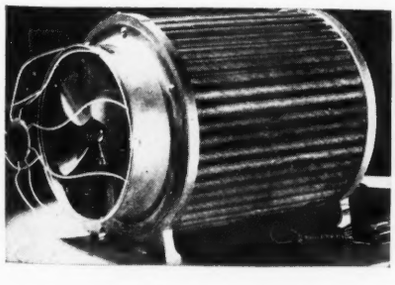
3 AIR-CONDITIONING CONTROL—Magnetic switch for control of air-conditioning motors operates directly from contacts of room thermostat or other low-voltage control instrument. Consists of a 3-pole magnetic switch mechanism, overload relays, and a low-voltage transformer assembled in one unit. *General Electric Co, Schenectady, N. Y.*

4 CENTRIFUGAL FAN—Reduced power consumption, quieter operation and less maintenance are claimed for "Silentvane," Design 7. Other features are slow rotative and peripheral speeds, self-limiting horsepower characteristics with gradually increasing horsepower and volume until point of maximum efficiency is reached, then decreasing horsepower for larger volumes. Available in all standard discharges, single and double width, with wheel diameters ranging from 14⅜ in. to 87 in., static pressures to 16 in. w g. *B F Sturtevant Co, 47 Readville St, Hyde Park, Boston, Mass.*

5 HEAT RECLAIMING SYSTEM—Principal of Schaub system lies in substitution of specially-designed orifice valves to drain steam-heated machines, for conventional individual steam traps. System is vented. High flash that would ordinarily occur with this method of drainage into open return line is eliminated in this system by patented method of heat exchange which transfers flash heat to feedwater on way to boiler. *Fred H Schaub Engrg Co, 325 West Huron St, Chicago, Ill.*

6 COOLING SURFACE—Series W (Water) surface is intended for air cooling and cooling and dehumidifying with cold water, or for air heating with hot water. Surface is fin-and-tube type that makes use of copper plates and tubes and plate-type aluminum fins. Headers are of extruded copper tubing, with copper return bends. All joints are silver brazed, and close tube spacing yields ample prime surface. *John J Nesbitt, Inc, State Rd & Rhawn St, Philadelphia, Pa.*

7 EXHAUSTER—Straight-line exhauster is for handling air containing steam, dirt, fumes, paint, spray, grease, vapors, etc. Unit is equipped with propeller fan which delivers large air volumes against duct or wind resistance. Location of motor outside air duct keeps it cool and clean, also reducing fire hazard when air mixtures being exhausted are inflammable or explosive. *L J Wing Mfg Co, 154 W 14th St, New York, N. Y.*



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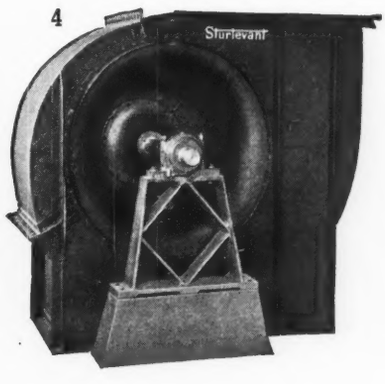

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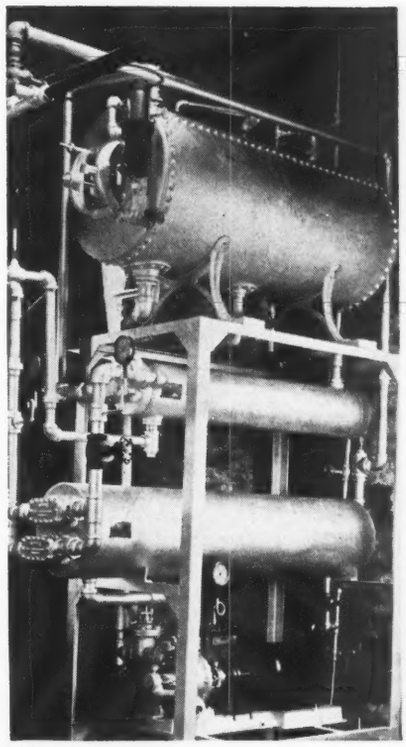

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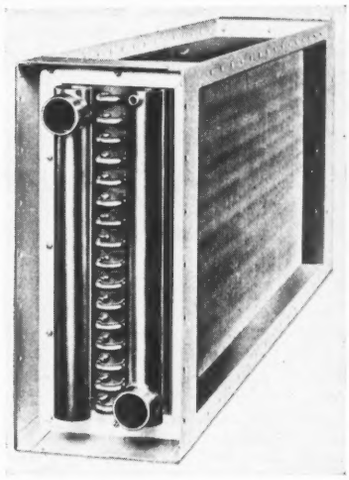

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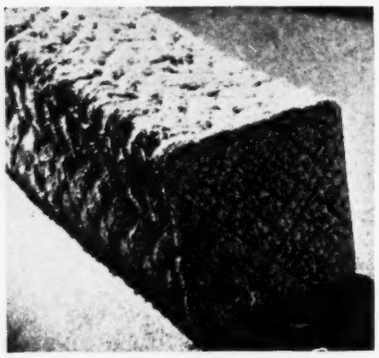
HOSE, PACKING AND PAINTS

BRAIDED PACKING—"Lattice-Braid" packing has every braiding strand passing diagonally through packing at an angle of about 45 deg. This makes for completely unified structure. Advantages claimed include longer service, greater flexibility, controlled porosity and automatic action. *Garlock Packing Co, Palmyra, N. Y.*



PACKING—Addition to line is Palmetto compressed sheet packing, made of long-fibre asbestos combined with bonding agents, and produced in uniform thicknesses. This is all-purpose flange and joint packing for superheated and saturated steam at high pressures and temperatures, for air, ammonia, gases, oils, gasoline and most chemical solutions. *Greene, Tweed & Co, 101 Park Ave, New York, N. Y.*

GASKET—Combines desirable properties of asbestos and Neoprene. In process gasket material is first blanked from asbestos sheet material, then coated with Neoprene cement developed to increase its resistance to passage of gases and liquids. This is used for light-pressure joints. When Neoprene-asbestos material is compressed further a new material is formed. This is said to have greater strength and is used for higher-pressure joints. *Victor Mfg & Gasket Co, Detroit, Mich.*

PACKING—Reinforced hydraulic "U" packing is doubly reinforced against wear on contact leg and against pinch from excessive clearance between plunger and gland ring. Standard reinforcement is tough chrome-tanned belting leather backed by oak-tanned belting leather stock. Patented phosphor-bronze spring spacer maintains light pressure against inside of beveled contact lip near its pressure edge. This insures a primary seal until packing lips can be set to plunger surface under pressure so as to carry seal to packing heel. *Wayne Davies Packings Co, 325 Huron St, Chicago, Ill.*

FLOOR DYE—Colorflex, enamel-like dye, has been made fire and acid-proof. Test made shows that gloss is not injured even when alcohol is poured on dye and flame applied, or when sample is dipped in acids of various types. Comes in four colors: tile red, emerald green, linoleum brown, and battleship gray. *Flexrock Co, Philadelphia, Pa.*

SEALING COMPOUND—Paste is graphite sealing compound for thread and gasket connections on lines carrying oily liquids and high-pressure steam. Paste expands when heated and requires only water for thinning. Joints made up with paste are easily disconnected without damage to threads or gaskets. *Key Co, 2633 McCasland Ave, E St. Louis, Ill.*

NON-SLIP PAINT—"Safe-T-Step" paint has rubber base combined with abrasive for taking skid out of all types of floors. Maker claims surface covered with coating is not slippery even when wet or oil-splashed. Requires no special preparation of floor aside from ordinary care and having surface clean, dry and free from oil at time of application. *Truscon Laboratories, Detroit, Mich.*

CEMENT—"Vulcalock" cement is not rubber, but Thermoprene, patented thermoplastic made by chemical alteration of rubber, which has consistency of light engine oil. According to manufacturer, cements have strength of bond ranging from 10 to 500 lb psi, depending on method of application and materials joined. Cements also said to resist cracking by bending, shock, or variations in temperature, and to have chemical resistance better than rubber. *B F Goodrich Co, 460 S Main St, Akron, Ohio.*

ALKALI-PROOF DYE—Laboratory tests, using sodium hydroxide as total alkali, indicate that "Colorflex" has now been made alkali-proof, according to makers. Alkali makes no mark, and does not even affect gloss on some colors. *Flexrock Co, Philadelphia, Pa.*

LUBRICATING EQUIPMENT

LUBRICATION SYSTEM — "Dualine, Jr" system has two moving parts. Contains no springs or check valves and is fully adjustable, according to manufacturer. Positive delivery of lubricant to each bearing is made independently of oiler's judgment or his ability to reach all bearings regularly. Maker claims new system will reduce labor of oiling, eliminate waste of lubricant, reduce repairs and maintenance, and prolong life. *Farval Corp, Cleveland, Ohio.*

AUTOMATIC LUBRICATOR—Simplex lubricator replaces oil cups and grease fittings on machinery of many kinds. Lubricator is essentially a spherical-steel shell with grease fitting and ⅛-in. pipe thread connection for insertion in bearing hole or suitable adapter. Inside steel shell is hollow Neoprene ball and outlet channel that prevents ball from clogging outlet. When grease or fluid oil is forced into fitting with conventional equipment, internal pressure may rise momentarily to 1500 psi. This pressure collapses ball and compresses air in it, thus storing energy for feeding lubricant to bearing. Resistance of bearing may be only 160 psi, and thus ball expands and flushes lubricant through bearing until internal pressure equals bearing resistance. Under these conditions some 120 drops of lubricant may remain in reservoir. *Simplex Mfg Co, 1504 Broadway, Detroit, Mich.*

HYDRAULIC LUBRICATOR—Bijur automatic lubricators have no mechanical-drive connection between machine and lubricator pump. In place of drive mechanism a small tube is connected between machine hydraulic system and pump used for feeding oil to various bearings. Lubricator pump is so arranged that inlet is submerged under oil in reservoir. This inlet

is protected by felt filter disk. At unit end opposite to lubricator cylinder and in direct line with it is hydraulic operating cylinder. Two pistons (lubricator and hydraulic) are connected by a common piston rod, ball-jointed to each. Compression spring surrounding piston rod tends to force the latter towards hydraulic cylinder. Thus, during low-pressure period of hydraulic cycle, complete piston-rod assembly moves under spring action to one end of stroke, drawing a definite amount of oil into lubricating cylinder. Then, at high-pressure period, assembly is forced to other end of stroke, discharging oil to oil-distribution system. *Bijur Lubricating Corp, Long Island City, N. Y.*

1 **LUBRICATOR** — "Mykrofeed" lubricator is designed to get oil by gravity, under controllable flow, from a transparent, air-tight reservoir, *A*, to bearings (see drawing). Ball valve closes reservoir and is opened by a pin actuated by a solenoid *B* or by hand. Latter is done by moving weight *C* to notch *R* in lever *D*, chain on the end of lever facilitating operation if necessary. When valve is open oil falls into constant-level chamber *E* until the level rises and liquid-seals the outlet at *F*. When this point is reached, flow stops, even if the valve is still open. Shallow trough *G* in which feed wicks, *H*, lie, connects to chamber *E*. Oil level in *E* is on a line slightly higher than bottom of trough *G* to keep wicks saturated with oil. Sight-feeds *J* show rate of feed. Brass fittings screwed into tapped holes *K* take copper tubing connecting lubricator with bearings. For electrical operation, solenoid terminals *L* and *M* are connected to machine's motor leads. Then, when machine switch is closed, solenoid plunger *O* pulls up pin *P*, lifting ball valve off its seat. When switch is opened, plunger *O* and pin *P* drop of their own weight, closing the valve. Ordinarily used only after a long shutdown period when bearings need more lubrication, self-closing valve *S* is held open by holding down lever *T*. Oil then bypasses wicks and goes directly to bearings. Lubricator handles all oils up to 2000 sec Saybolt. As much as 50% variation in feed rates is obtainable without adding or removing wicks. This is done by

raising or lowering wick unit in its well by a screw in bottom of well. *Bromley & Sons, 232C Chestnut St, Kearny, N. J.*

2 LUBRICATION FITTINGS — "Lubriguards" should be installed directly into bearings, as shown in illustration, left photo. In operation, hydraulic-type pressure-gun (1), is applied to fitting. Lubricant (2) is forced through inlet of hydraulic fitting, (3) installed on bearing housing, (4) into the antifriction bearing (5). When a predetermined amount of backpressure is developed in bearing, excess lubricant appears in vent (6), showing operator that bearing is sufficiently lubricated. In right-hand illustration, bushing (4) enables bearing equipped with button-head, dot, pin-type and other conventional-type bushings to receive Lubriguard protection. (1) is pressure gun, (2) lubricant, (3) fitting, (4) bushing, (5) bearing housing, (6) bearing and (7) excess-lubricant vent. *Alemite Div, Stewart-Warner Corp, 1826 Diversey Parkway, Chicago, Ill.*

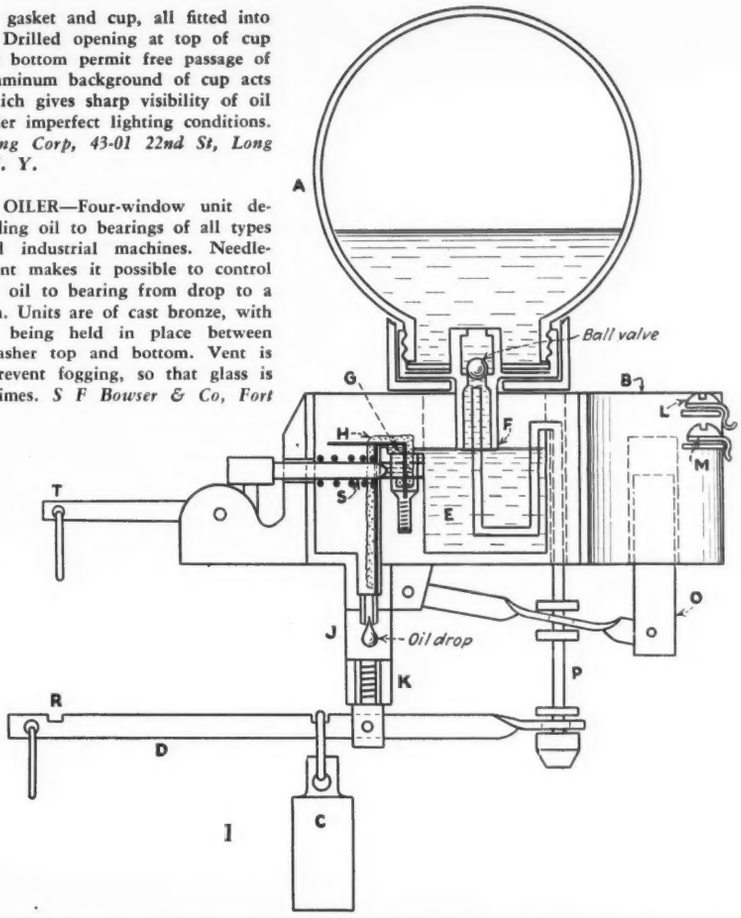
3 WICK-FEED OILER—Trico oiler is intended for use on machinery which operates intermittently. Lever at top, when in vertical position, starts feed, and when flipped to side, shuts it off. When oiler is filled above point where wick enters center tube, surplus oil drains into bearings, flushing them. When oil recedes to tube opening, wick automatically feeds oil to bearing by capillary action. *Trico Fuse Mfg Co, 2948 N 5th St, Milwaukee, Wis.*

4 OIL FLUSHER—"Port-O-Flush", portable pressure oil flusher and dispenser, is used in cleaning and flushing bearings on machines, etc. Oil is introduced to bearing at 60 to 100 psi by air or gas pressure. Unit is portable and self-contained, no pressure connections being necessary. Pressure is obtained by means of small supercharger which has carbon-dioxide gas in it at 1000 lb pressure. After filling container with quart of oil, charger is inserted into housing. Will handle oils of all viscosities, according to maker, from kerosene to 600-W transmission oil. *J A Honegger, 223 Spruce St, Bloomfield, N. J.*

5 PULLEY OILER—Trico oiler operates on three different principles: Thermal, Capillary and gravity action. Copper tube transmits heat of pulley hub to oil reservoir, to produce quick thermal action, wire-reinforced wick feeds oil by capillary action, and it is dropped on bearing by gravity. No attention required save occasional filling of reservoir. *Trico Fuse Mfg Co, 2955 N 5th St, Milwaukee, Wis.*

6 OIL WINDOW—General-purpose oil window is self-contained unit offered for use in conjunction with oil reservoirs, containers and lubricators. Comes as a ring, which is chromium plated, with polished face pressed flush, window, gasket and cup, all fitted into metal pocket. Drilled opening at top of cup and another at bottom permit free passage of oil. Bright aluminum background of cup acts as reflector which gives sharp visibility of oil level, even under imperfect lighting conditions. *Bijur Lubricating Corp, 43-01 22nd St, Long Island City, N. Y.*

SIGHT-FEED OILER—Four-window unit designed for feeding oil to bearings of all types of power and industrial machines. Needle-valve adjustment makes it possible to control the feeding of oil to bearing from drop to a constant stream. Units are of cast bronze, with glass cylinder being held in place between heavy cork washer top and bottom. Vent is provided to prevent fogging, so that glass is clear at all times. *S F Bowser & Co, Fort Wayne, Ind.*



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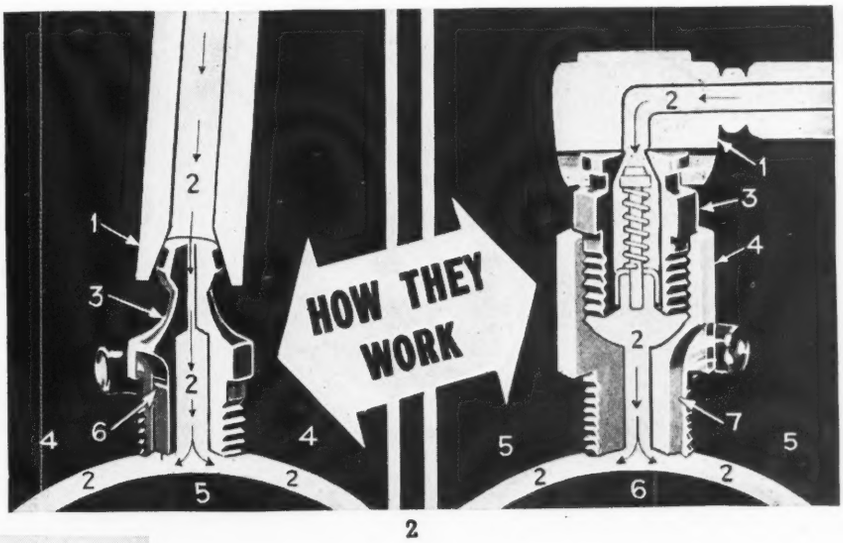

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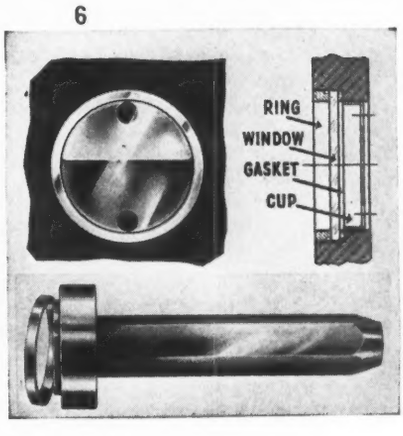

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1 BEARING SEAL—"Mechani-Seal" design is integral part of bearing, and requires only housing of simple design with minimum of machining. Two steel plate shields, widely separated to form a trap, serve as innermost members, both attached to outer bearing ring. Another steel plate, pressed on bearing inner ring, acts as slinger when inner ring is rotating. Definite though extremely close clearances exist between individual members so that nothing is added to bearing friction. *Fafnir Bearing Co, 77 Booth St, New Britain, Conn.*

2 ELECTRIC HOIST—"Load King" is air-cooled, wire-rope electric hoist, made in two capacities: ½ and ¼ tons. Available in three types: lug, hook, or plain trolley, with a choice of either right-angle or parallel suspensions. Other features claimed by maker are maximum ruggedness, standardized interchangeability of repair parts, small over-all dimensions, and high over-all efficiency. *Philadelphia Div, Yale & Towne Mfg Co, Philadelphia, Pa.*

3 STORAGE CONTROL—"Tellevel" control consists of multiple-electrode sealed mercury switch so mounted that tipping it in any direction will break electric current. Polished aluminum bell provides dust-tight housing for switch and electric wiring. Controls are installed in such installations as hoppers, see illustration, where shortage of material starts switch connected to supply source, through lower control. Hopper then fills up, and when material reaches top control, it forces bell sideways, breaking current and stopping flow of material. *Stephens-Adamson Mfg Co, 5 Ridgeway Ave, Aurora, Ill.*

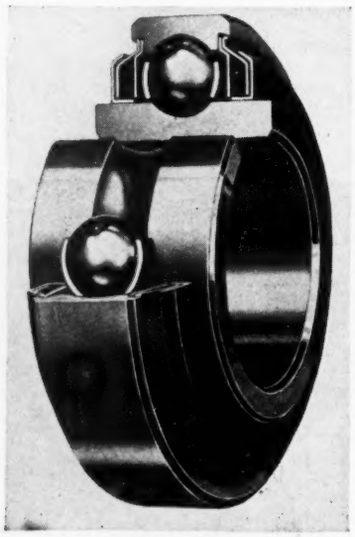
4 SINGLE-DRUM HOIST—Class L-111 reversible Pistonair hoist is designed for both surface and underground operation, and is fitted with Lubriseal ball bearings. Comes with large drums and 4-cyl reciprocating air motor. Furnished with either positive or friction-type clutch and is available fully enclosed for protection against dust and dirt. *Sullivan Machinery Co, Michigan City, Ind.*

5 ELEVATOR-CONVEYOR — "Mass-Flo" elevator-conveyor provides unique method of handling granular materials such as coal, sawdust, chemicals, etc. Simple in design and construction, unit consists of a steel casing through which solid pivoted flights spaced at intervals on single strand of chain. Moves material horizontally or vertically in solid mass or with partial load. At discharge point, see illustration, flights are discharged by tripper, and unit can be emptied after feed stops. *Jeffrey Mfg Co, 932-99 N 4th St, Columbus, Ohio.*

6 BELT VULCANIZER—No. 36-42 vulcanizer, made by J C Heintz Co for B F Goodrich, has platen 12-in. wide and long enough to span a 36-in. belt when vulcanizer is clamped on belt at approximately 22½-deg angle. Unit is plugged in circuit similar to any appliance, and comes equipped with thermostats for maintaining proper vulcanizing temperature. Current is turned on and off with variations of only 1 deg, while adjusting screw on control case permits adjustment to any temperature from 220 to 315 F. *B F Goodrich Co, 460 S Main St, Akron, Ohio.*

7 SPEED REDUCER—Double-spur, or combination spur and internal gear, ball-bearing mounted on drive shaft eccentric, meshes with stationary internal gear, and provides high ratio speed reductions without large gears or drives. In mesh with secondary gear is either a spur or internal gear, which is solid and concentric with output shaft. Eccentric drives initial spur around pitch line of stationary internal gear, and, since initial spur and secondary gear are solid, speed of latter is controlled by ratio between initial spur and stationary gear. *Brad Foote Gear Works, 1301 S Cicero Ave, Chicago.*

8 VIBRATORS — Explosion-proof vibrators are addition to standard line, and are for use where atmospheric conditions are dangerous. They are heavy, pulsating electromagnets fully encased in thick, electric-furnace steel case, with ground joints and armored cable lead. Remote electric control panel containing rectifier operating switches and rheostat for controlling vibrator is also fully enclosed in cast-iron case, with ground joints and approved explosion-proof fittings.



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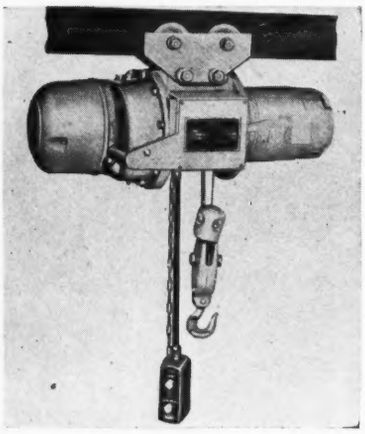

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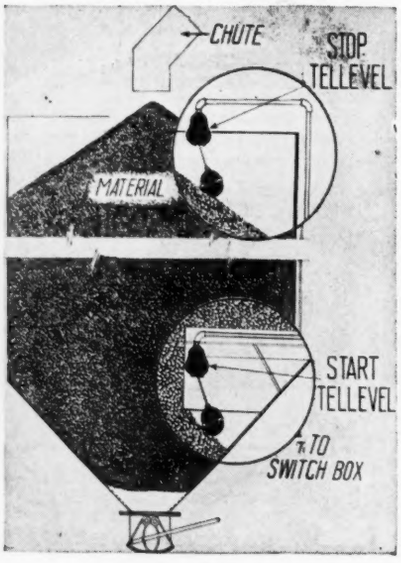

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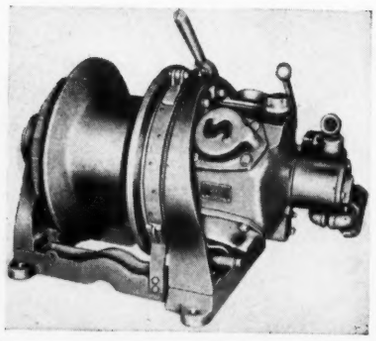

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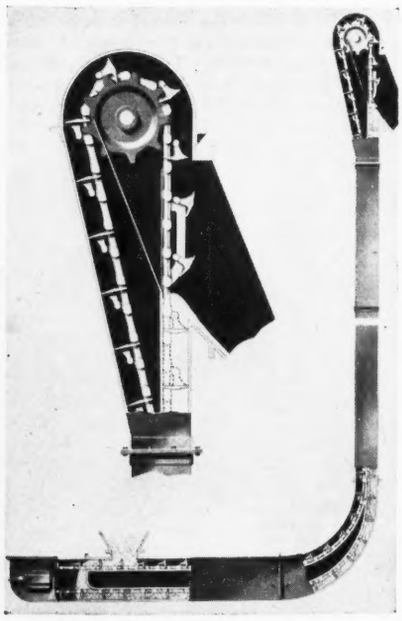

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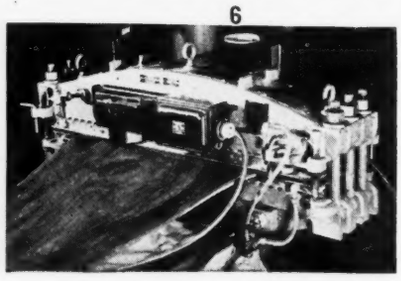

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For attachment to bins, chutes, hoppers, etc, to prevent arching-over and hanging-up of material. *Syntron Co, Homer City, Pa.*

9 MERCURY CLUTCH—Utilizing mercury to displace friction segments by centrifugal force, clutch gradually picks up load at full speed. In operation, mercury displaces clutch segments inward, where they engage drum at proper time and speed, a positive drive thereby effected when speed of housing and driven drum are synchronized. Overloads and other shocks are said not to be transmitted through clutch to prime mover, because clutch capacity limits torque transmitted. *Mercury Clutch Corp, 637 W 3rd St, Massillon, Ohio.*

10 PULLEY COVERING—Non-slip pulley covering comes in sheets 3 x 3 ft, and for application is torn into strips. Enough is used to go around pulley twice, including lapping, and is applied as shown in illustration. According to maker, one application lasts about 2 years. To apply, clean pulley, tear off strips of covering of proper width, soak in hot water to soften, and wrap around pulley, as illustrated. *Nonslip Pulley Covering Co, 777 Hertel Ave, Buffalo, N. Y.*

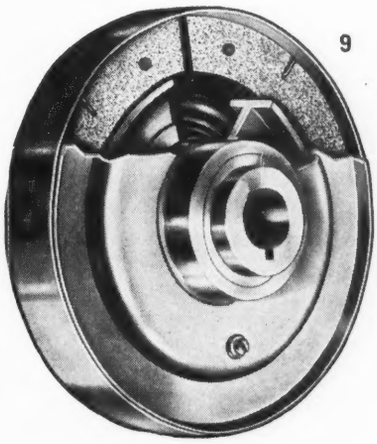
11 COAL UNLOADER—As accelerator in unloading coal with high moisture content and tendencies to stick, device is said to unload car of coal in half usual time. Consists of crane-mounted screws over railroad tracks where cars are unloaded. Operator in cab controls direction of travel of supporting crane and screws of accelerator in coal. *Stephens-Adamson Mfg Co, 5 Ridgeway Ave, Aurora, Ill.*

12 STOKER-DRIVE TRANSMISSION — Lewellen transmision regulates stoker speed for feeding fuel at rates to maintain automatically boiler pressure setting. Control attached to boiler is set for any desired steam pressure. Deviation from this pressure will result in movement of control connected to safety lever on transmission. While lever follows any rapid motion of controlling device, speeds are adjusted only at safe rate of acceleration. When boiler pressure returns to preset figure, safety lever has reset for operating position. *Lewellen Mfg Co, Maple Ave, Columbus, Ind.*

13 REMOTE CONTROL — Single, right-angle, mechanical-remote control for U. S. Varidrive motors said to provide accurate simple means of selecting desired operating speed where motor is mounted above or below driven machine, or is otherwise hard to reach. Control can be extended in any one of eight different directions at 90 deg and is operated by enclosed set of helical right-angle gears. *U. S. Electrical Motors, Inc, 200 E Slauson Ave, Los Angeles, Calif.*

14 PILLOW BLOCK — Double interlock roller bearing pillow block was designed for simplified mounting on ordinary commercial shafting where comparatively light loads are to be carried. To secure bearing to shaft on which it is mounted, collars with two setscrews are placed on outside of each end of extended inner race ring. These screws pass through unthreaded holes in race ring, bear directly on shaft on one side and clamp race ring directly against shaft on the other. Pillow block is made in both expansion and non-expansion types, and labyrinth seals are provided to retain lubricant and protect bearing against foreign material. *Dodge Mfg Corp, Mishawaka, Ind.*

WORM SPEED REDUCER—Line is newest to be manufactured by company, with ratios ranging from 4 5/6 to 1 up to 100 to 1, and input capacities of from ¼ to 2 hp at 1800 rpm, and ⅛ to 1½ hp at 1200 rpm. Gears, wheel and worm are assembled in semi-steel, oil-tight housing with bearing supports for both worm and worm-wheel machined in one casting, eliminating split bearings and shims. *Abart Gear & Machine Co, 4832 W 16th St, Chicago, Ill.*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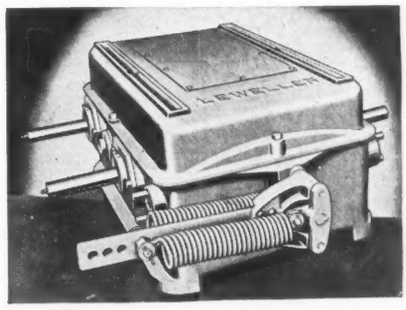

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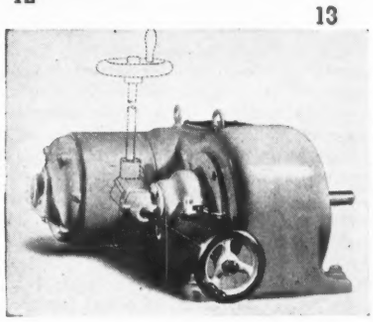
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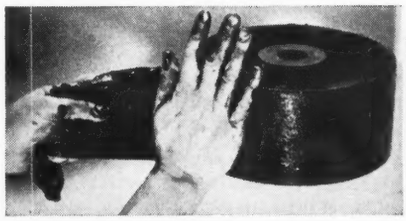
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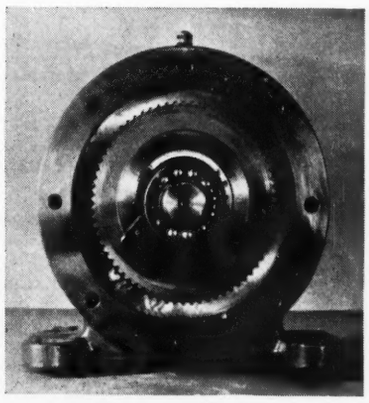
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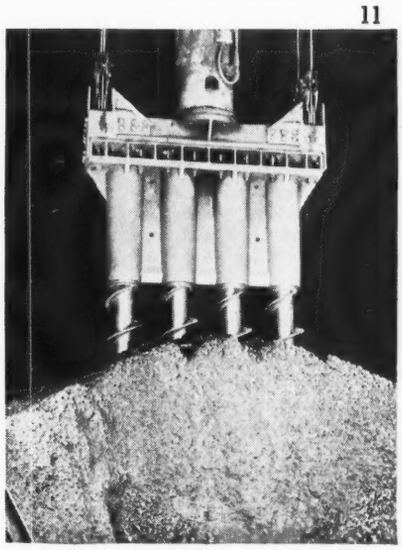
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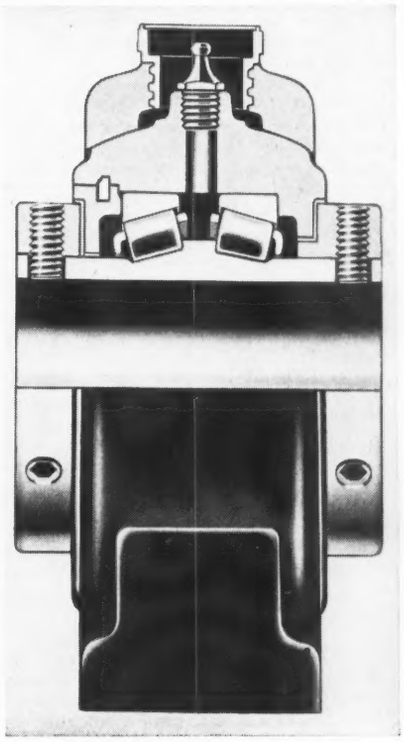
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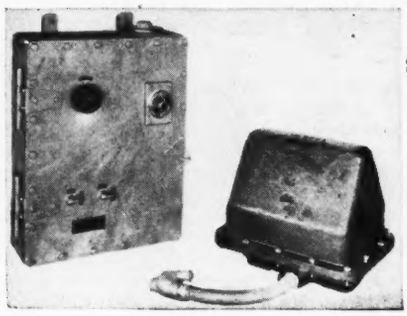
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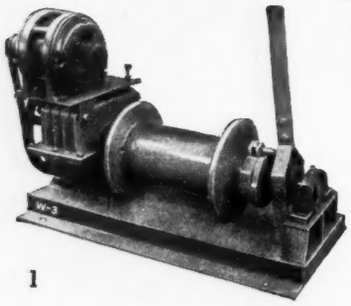

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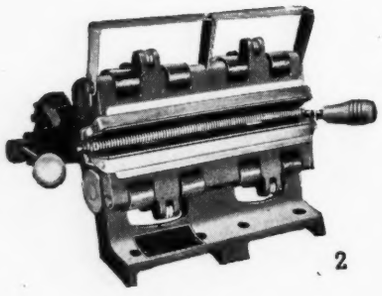

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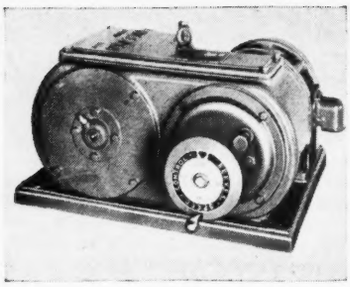

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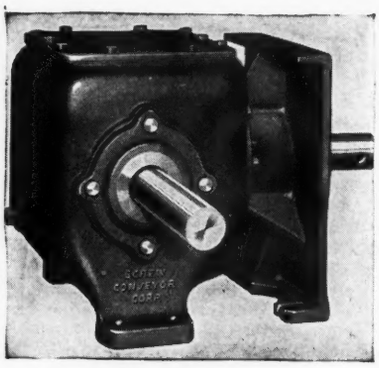

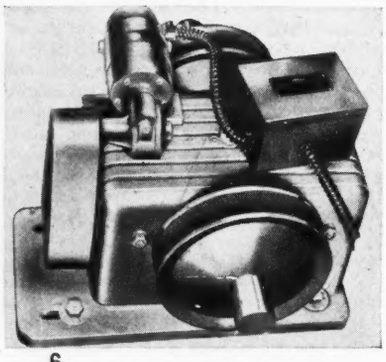

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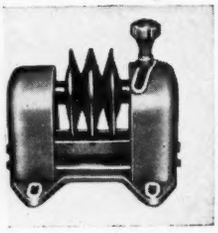

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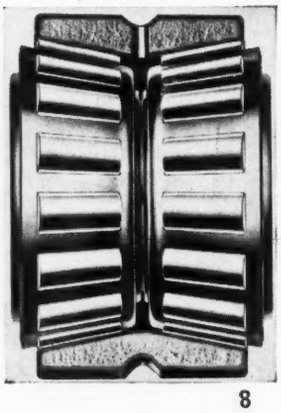

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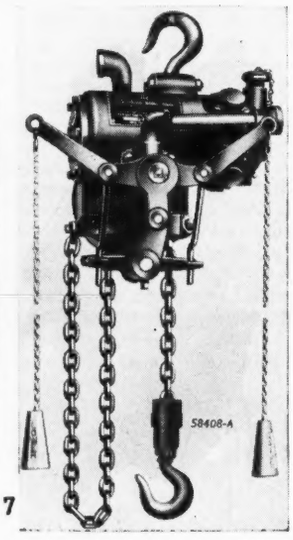

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1 MOTOR WINCHES—Saco winch is furnished in variety of sizes to handle small or large capacities. Feature is jaw clutch which releases pulling rope when disengaged. While formerly it was necessary to run winch in reverse direction to pay out rope, clutch can now be disengaged and rope paid out without reversing winch. Another feature is incorporation of Saco speed reducer in winch. This enables speed of drum to be determined by simply placing proper sized sheaves on motor drive shaft of speed reducer, since first and second reduction take place through adjustable V-belts and cut-steel helical gears. *Stephens-Adamson Mfg Co, 5 Ridgeway Ave, Aurora, Ill.*

2 BELT LACER—Safety portable belt lacer No. 15 has 15 in. of ribbed jaw faces that will lace from 1 to 15 in. of belt width in one operation. New unit is similar to 6-in. lacer now on market. Lacer will be built on order only and for users of Safety Belt Hooks. *Safety Belt Lacer Co, Factories Bldg, Toledo, Ohio.*

3 SPEED INDICATOR—"Speedial" is improved type of handwheel-speed indicator for use with Reeves transmissions. Said to indicate accurately speed settings of different units. Actual indication is definite number of turns of speed-shifting screw of unit. For each full turn of shifting screw, Speedial, with indicator attached, registers one point, or degree, on circular scale. Unit is offered as optional equipment at extra cost in place of standard speed-control handwheel and indicator on various drives. *Reeves Pulley Co, Columbus, Ind.*

4 SPEED CONTROL—Vernier control can be supplied for all sizes of Link Belt PIV gear variable-speed transmissions, where fine speed changes are required. Can be furnished with either of two ratios: 7½ to 1, or 30 to 1, and is equipped with two handwheels. One is for direct control; secondary, or vernier-type control handwheel will provide either 30 or 7½ turns to one of direct wheel, depending on type selected. *Link Belt Co, 307 N Michigan Ave, Chicago, Ill.*

5 GEAR HOUSING—"Ace" unit is one-piece enclosed, anti-friction counter-shaft box end. Designed to bring power losses to minimum, as well as to provide protection from fires, accidents, etc. Houses both gears and bearings, is completely sealed from dirt and dust, as well as oil-leak proof. Box end is interchangeable with old types and is designed with safety factor in excess of normal horsepower requirements. *Screw Conveyor Corp, 744 Hoffman St, Hammond, Ind.*

6 SPEED TRANSMISSIONS—Models in line supplement standard line from fractional- to 7½-hp capacity controlled with lever-type control. New units are equipped with electric motorized control; 2-button switch controls speed. Changes in speed are made by pushing and holding either slow or fast button until desired speed is obtained. *Ideal Commutator Dresser Co, 1025 Park Ave, Sycamore, Ill.*

7 AIR HOIST—"Air-Bloc" hoist is for light loads up to 700 lb. Unit weighs less than 75 lb and can be easily moved from one job to another. Automatic up- and down-stop control prevents damage to hoist from overrun of chain in either direction. Other safety feature prevents load from dropping even if air supply fails. Motor which powers hoist is 4-cyl, radial-type air motor, with throttle control permitting easy and accurate spotting of load. *Ingersoll-Rand Co, Phillipsburg, N. J.*

8 ROLLER BEARING—Modified design of standard NA type, or non-adjustable roller bearing, is made up of double-row outer-race or cup and two single-row inner races or cones. Unit is designed to serve as a sheave bearing. Races and rolls are ground to established precision limits so that when cones are assembled into cups, front faces of cones contract and proper running clearance is provided. Tapered races of two rows of rolls being directed one toward the other results in bearing of extreme rigidity, thus preventing wobbling of sheave. *Timken Roller Bearing Co, Canton, Obio.*

9 SPEED TRANSMISSION—"All Speed" V-belt variable-speed transmission has speed selector which operates on variable-pulley principle. Selector consists of two interlocking pulleys mounted on common shaft. Variable-speed spindle can be pivoted laterally between motor and driven machine to provide new running diameters on interlocking pulleys. Selected speed is maintained by lock nut on control quadrant. *Standard Transmission Equipment Co, 416 W 8th St, Los Angeles, Calif.*

BELT FASTENER—"Flexo" belt fastener made in new size for joining elevator and conveyor belts from 5/16 to ½-in. thick. Unit is constructed and applied in same manner as others. Metal plate spans joints on opposite sides of belt which are drawn tightly together by two bolts through belting. Bolt heads and nuts are countersunk and protruding bolts broken off. Completed joint, since it is a series of separate fastenings, can assume trough of conveyor as easily as rest of belt. *Flexible Steel Lacing Co, Chicago, Ill.*

VIBRATOR—Units are fitted with hooks for attachment to bottoms of railroad cars to facilitate unloading coal, etc. They are large pulsating electromagnets striking 3600 times per minute and together with hook weigh 950 lb each. Used in pairs, two to a car on opposite sides, units must be provided with means of handling, such as overhead crane, etc. Each vibrator comes with separate electrical control panel that contains thermionic valve for changing alternating to pulsating current, operating switches and variable resistance for controlling vibrator's amplitude or power. *Syntron Co, 492 Lexington Ave, Homer City, Pa.*

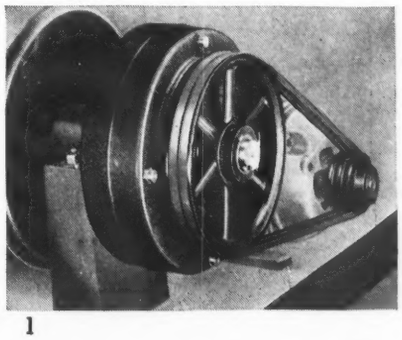
SPEED CONTROL—Several changes made in JFS-Jr speed control. These include long bronze bushings on center pulley halves which slide on rotating shaft, and changes in universal base structure. New bushings can be inserted to renew drive, instead of needing entire pulleys. Universal base which can be changed in position depending on relationship of drive and driven pulleys is mounted on sub-base which is at right-angles to rotating shaft, rather than at an angle, as was formerly the case. *Columbia Vari-Speed Co, Wheaton, Ill.*

1 SPEED REDUCER—"American" reduction drive consists of two major elements. Helical-gear reduction unit mounts directly on shaft of driven machine and standard belt drive is between motor and input-shaft of reduction unit. Unit itself has standard, fixed ratio of 13 to 1, any greater or lesser ratios being accomplished by primary belt drive. For example, where over-all reduction ratio of 52 to 1 is desired, belt drive is selected with ratio of 4 to 1. This ratio, in combination with the ratio of the reduction unit, delivers desired speed. *American Pulley Co, Philadelphia, Pa.*

2 VARIABLE-SPEED CONTROL — Reeves Vari-Speed Jr has been added to line. Unit consists of disk assembly and adjustable motor base. Disk assembly comprises two cone-shaped disks, one stationary and other laterally adjustable, a self-adjusting tension spring, a spring-adjusting nut and cover. By means of handwheel, motor is moved forward and back. When nearest to driven sheave, V-belt runs over largest diameter on disks and maximum speed is secured. Reversing handwheel moves motor away from driven sheave and V-belt runs over smaller diameter on disks, adjustable disk moving out to accommodate belt, and speed is reduced. *Reeves Pulley Co, Columbus, Ind.*

PULLEY FACING—Powerlox is synthetic leather paste used to coat pulleys and eliminate belt slippage. Compound is said to be impervious to effects of oil, grease, gases, acid, dust, frost and heat. It is only necessary to clean pulley and apply compound with applicator supplied. *Powerlox Mfg Co, 507 Fifth Ave, New York, N. Y.*

V-BELT—Believed to be first V-belt made which prevents accumulation of static electricity, belt retains static-discharging qualities during entire service life. Belt will be sold, for the present time, only to machine or equipment makers. Important feature of belt is absence, says maker, of any danger of belt acting as a "short" between motor and operator. Resistance built into belt is just enough so that belt itself cannot act as direct passage for current. *B F Goodrich Co, Akron, Ohio.*



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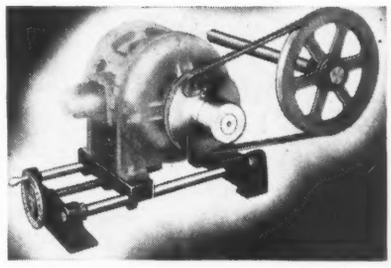
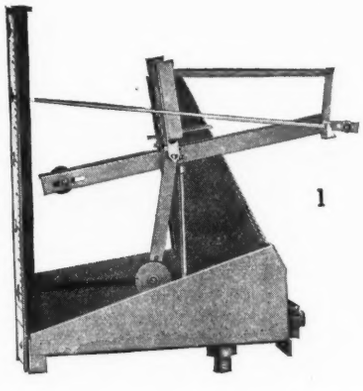


METERS AND INSTRUMENTS

1 DIAPHRAGM GAGE—Ellison straight-line diaphragm gage has high-power, free-floating diaphragm on bottom of casing, suspended through ball joint from knife-edge eyelet bearing. For minus pressures, draft line connects with bottom of diaphragm casing, connecting rod passing through top of casing. For plus pressures, draft line connects with top of diaphragm casing, conecting rod operating through the bottom by means of a metal link around casing. For differential pressures, draft line connects with top of diaphragm casing for high absolute pressure and with bottom for low. *Ellison Draft Gage Co, 214 W Kinzie St, Chicago, Ill.*

2 PSYCHROMETER — Hand-aspirated psychrometer is used for measurement of relative humidity. Typical air at correct velocity is induced over shielded thermometer bulbs by use of hand pump while operator holds instrument stationary and watches wet-bulb reading move down to finality. *Julien P Friez & Sons, 4 N Central Ave, Baltimore, Md.*

3 FLOWMETER—Dial-type indicating flowmeter has extra-large movement designed to reduce lost motion. Wide-spaced bearings are said to insure perfect alignment of moving parts, and direct driving action makes calibration accurate and permanent. Patented check floats said to prevent loss of mercury from over range, reverse flow or faulty operation of valves. These valves are located so that they are always immersed in mercury and protected against moisture, dirt, etc. *Foxboro Co, 38 Neponset Ave, Foxboro, Mass.*



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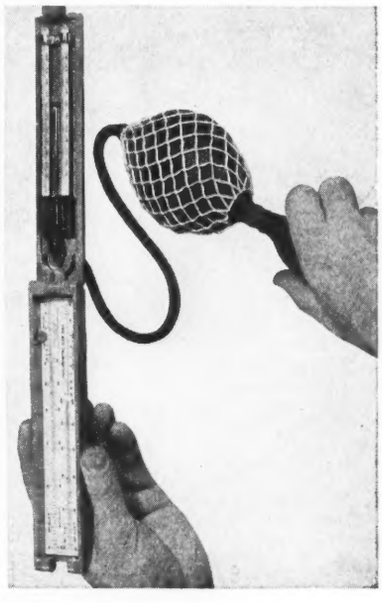

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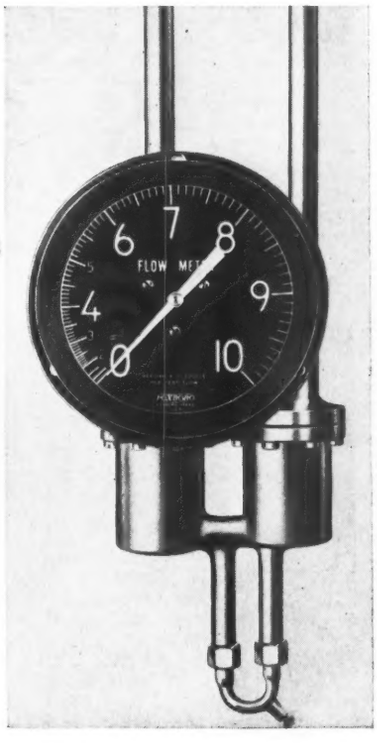

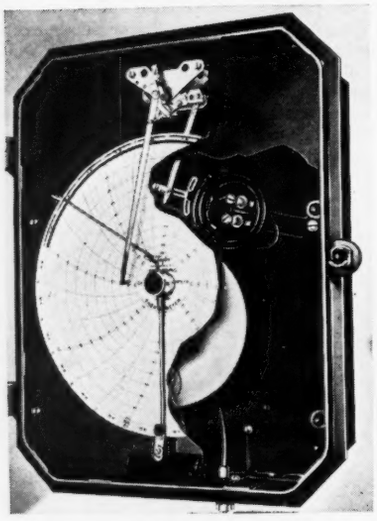

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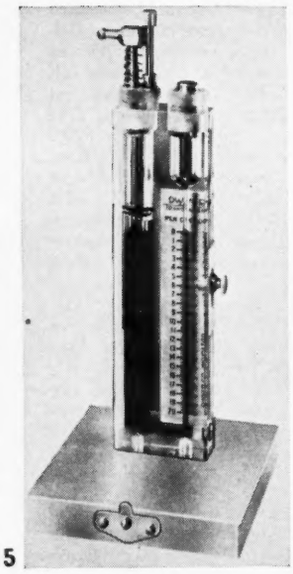

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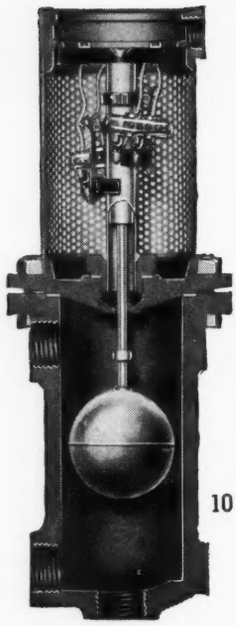

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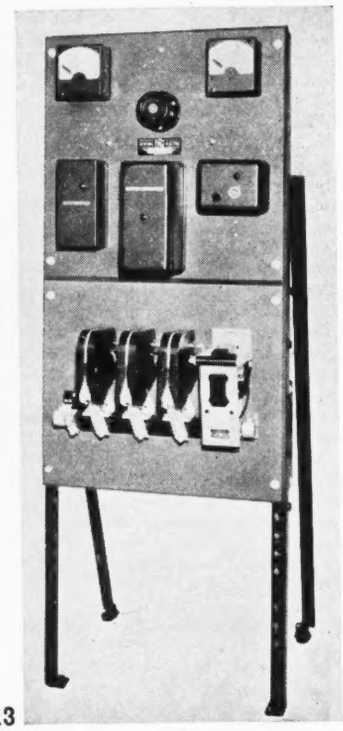

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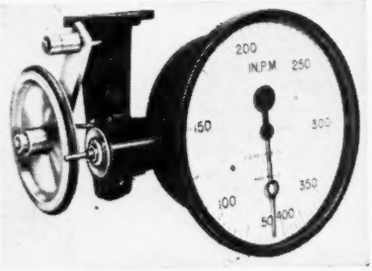

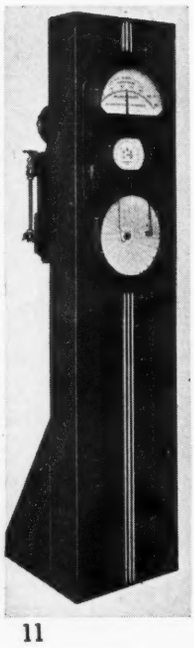

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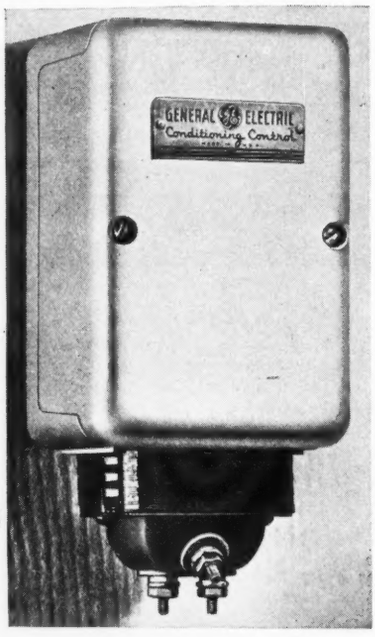

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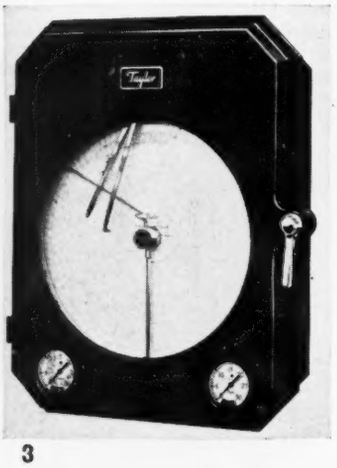

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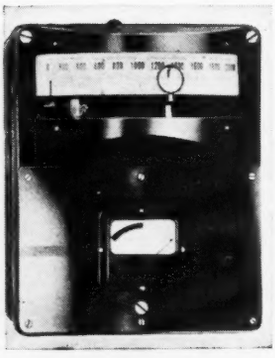

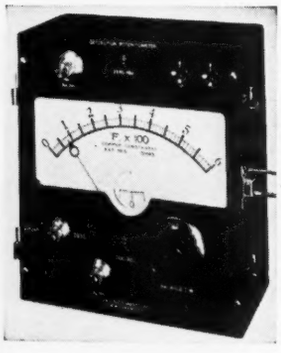

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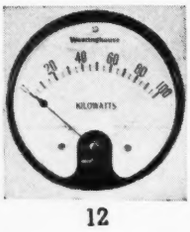

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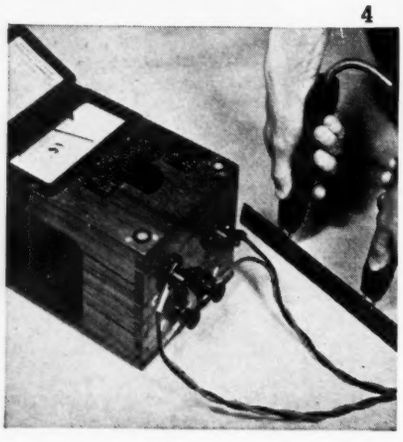

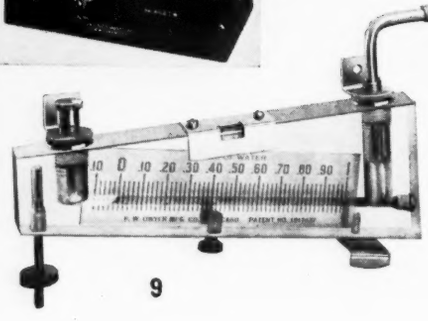

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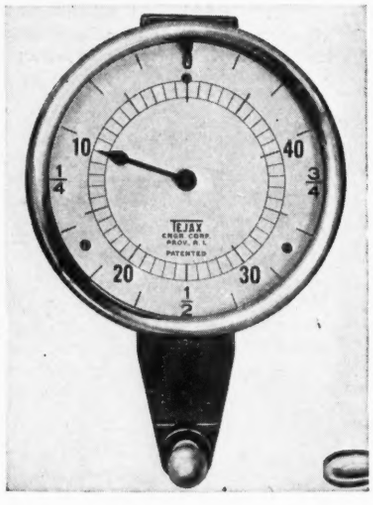

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1 RECORDERS—Companion to line of Fulscope instruments, recorders can be used for temperature, pressure, humidity, load, rate of flow, liquid level, etc. Exclusive of controller mechanism, recorders and recording controllers are identical. New universal case is for both face and flush mounting, and dust and moisture are sealed from case by Neoprene door gaskets and bayonet-action latch. *Taylor Instrument Cos, Rochester, N. Y.*

2 RING-BALANCE METER — Mechanical ring-balance meter can be used for metering steam, water, gas air, etc, at static pressures up to 1000 lb psi. Meter is said to give full-scale readings on differentials as low as 3-in. of water, and is easily adjustable. Furnished with any combination of indicator, recorder and cyclometer-type integrator. *Republic Flow Meters Co, 2222 Diversey Parkway, Chicago, Ill.*

3 RECORDING CONTROLLER — Fulscope air-operated recording and indicating controllers combine conventional proportional-response and automatic-reset forms of control, and introduce a third-process control effect: "Pre-Act". This is a supplementary control feature which makes control-valve corrections according to control-point-deviation rate. In response to sudden disturbances in process or variations in controlling medium, overpeaking or oscillation is reduced by an immediate and relatively larger control-valve action. Automatic reset feature, which compensates for change in load, is in instrument case and is said to be fully adjustable over a wider range than before. Pneumatic sensitivity reduction gives stabilized controller performance, and relation between pen-movement and output air pressure is so linear that instrument may be used for a remote pneumatic transmitter. Simplified air system includes improved relay air valve with drilled sapphire orifice; removable 18-8 stainless-steel nozzle; built-in metal-disk auxiliary air filters to supplement large external filters; and air gages inside case. Operates on 20-lb air supply. *Taylor Instrument Cos, Rochester, N. Y.*

4 OHMMETER — "Ducter" low-resistance ohmmeter is direct-reading, cross-coil true ohmmeter for measuring low resistances. Operates on dc fall-off potential method, but instead of using separate current and voltage-measuring instruments, result is indicated directly. Moving system consists of two coils mounted rigidly together on common axis in field of permanent magnet. Current in current coil is proportional to that through resistance under test. This tends to move pointer toward zero on the scale. Current in potential coil is proportional to drop between potential contact points across resistance under test, and tends to move pointer to top of scale. As moving system is not controlled by any other source, its final position is dependent only on equalization of these two opposing forces. It therefore indicates resistance in ohms and fractions of an ohm. *James G Biddle Co, 1211 Arch St, Phila, Pa.*

5 CO_2 INDICATOR—Dwyer pocket CO_2 indicator is of unbreakable, transparent, plastic construction. Carrying case has built-in compartments for draft gage and thermometer, and self-closing valve prevents loss of absorbent solution. Analyses are run by holding inlet plunger down while pumping sample in and raising and lowering the absorption unit. *F W Dwyer Mfg Co, 563 W Washington Blvd, Chicago, Ill.*

6 TACHOMETER—Improved stationary tachometers show: (1) rpm, right or left, of revolving objects, such as shafts, spindles, etc, (2) surface or peripheral speed in any desired unit, inches, feet, etc, (3) speed variations occurring during a fraction of one revolution. Illustration shows tachometer adapted for inches-per-minute readings by means of special swinging bracket and contact wheel. Wear of rubber-tired pulley said not to affect accuracy of readings. Units may be driven in any manner, such as belt, gears, flexible shaft or coupling. *O Zernickow Co, 15 Park Row, New York, N. Y.*

7 PYROMETER CONTROLLER — Moving parts in control circuit are eliminated in electronic pyrometer controller. Pointer of millivoltmeter movement is not engaged or retarded at any point within its normal operating range, thereby leaving it free to indicate continuously temperature under control. Control is by means of new electronic circuit, using a single high-output, all-metal vacuum tube. Milliammeter on front of instrument indicates condition of control circuit at all times. *Bristol Co, Waterbury, Conn.*

8 POTENTIOMETER-PYROMETER — Model 70-PO measures temperatures by means of thermocouples in otherwise inaccessible places. Instrument uses no standard cell. Patent-applied-for circuit requires only flashlight cell. Special microammeter features automatic cold-junction compensation inside case. Thus, no adjustment has to be made for change in room temperature. Instrument is independent of thermocouple resistance, permitting small thermocouple to be used, which can be easily replaced. *J-B-T Instruments, Inc, 441 Chapel St, New Haven, Conn.*

9 PORTABLE DRAFT GAGE—Transparent gage measures draft, air velocity, and slight pressure variations. Indicating tube and oil chambers are drilled and reamed in solid block of clear transparent plastic. This is aid to insure polished uniform bores and eliminate strain between parts. Leveling bubble is only glass part, and is well protected. Scale graduations extend full five inches, with more than an inch of sliding adjustment, and scale is held under spring tension. *F W Dwyer Mfg Co, 563 W Washington Blvd, Chicago, Ill.*

10 LIQUID-LEVEL CONTROLLER—"Magnetrol" transmits float movement through magnetic force instead of rotary shaft or stuffing box. Provides 5-point control; pump regulation, low-water cut-off, low-water alarm, high-water alarm and high-water cutoff. Made in two models, for working pressures up to 550 lb. Special time-delay relay available to give proper control operation even under surging water-level conditions. *Fred H Schaub Engrg Co, 325 West Huron St, Chicago, Ill.*

11 REGISTER, INDICATOR AND RECORDER—Type M series is latest model of first unit brought out about 25 years ago. At rear of register two large mercury wells, connected at the bottom, forming a U-tube, receive the differential pressures, either direct or by air-relay transmissions through usual small pipes from inlet and throat. On one of mercury columns rests solid metal float of large diameter which provides actuating force responsive to minute variations in mercury levels. Through a positive rack-and-gear transmission, float movement determines position of rate-indicator-dial hand, chart pen, and driving roller of totalizer. Working parts are balanced and entire mechanism mounted in same metal frame. Corrosion-resisting metals are employed for shafts, bearings, and other working parts. *Builders Iron Foundry, 7 Codding St, Providence, R. I.*

12 WATTMETER — Direct-current instrument operates from standard 50 millivolt ammeter shunt. Construction is similar to that of usual dc-shunted ammeter except that magnetic field is produced by electromagnet energized from line voltage. This magnetic circuit is made from Hipernik, an alloy of iron and nickel. Instruments available in conventional designs, or in shapes to match present switchboard instruments. *Westinghouse Elect & Mfg Co, East Pittsburgh, Pa.*

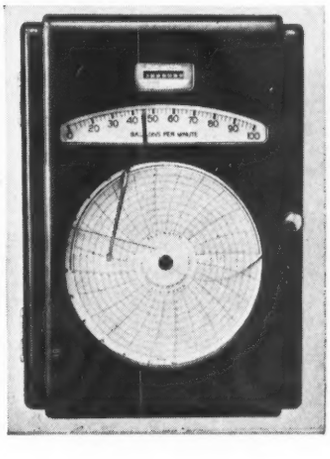
13 SYNCHRONOUS MOTOR CONTROL —Control waits until motor reaches correct speed and then selects an instant of favorable angular relation of stator and rotor poles to apply field. Protection of squirrel-cage winding is provided by separate relays which match different characteristics of two windings. *General Electric Co, Schenectady, N. Y.*

14 STOKER-CONTROL RELAY — Single-pole relay combines low-voltage control transformer, relay and terminal board, for controlling stokers in conjunction with time switch, limit control, and room thermostat. Unit can be used as relay for blower motors of unit heaters controlled from room thermostats and as a relay between room thermostats and condensing units in central-plant-cooling systems. However, it is designed primarily for use in conjunction with hold-fire timer and limit control to form complete stoker-control system. *General Electric Co, Schenectady, N. Y.*

15 DIAL INDICATING HANDWHEEL—Model No. 5-WC dial indicating handwheel for stems or shafts in a horizontal position, regulates and positions variable-speed drives, distance between rollers, width of gates, shutters, dampers, and other equipment controlled by means of rotary or screw motion. Available with from 12 to 50 turns. *Tejax Engrg Corp, 1 Allens Ave, Providence, R. I.*

GAGE STRIPS—Extendable gage strips can be added, foot by foot, to fit any height, for gasoline, oil, water and other tanks. Strips are one foot each in length and are locked together by foot numeral inserts. Each strip is 2 x 12 in., and ⅛ in. thick, available in one of two finishes, molybdenum or chrome. *J A Campbell Co, 645 East Wardlow Rd, Long Beach, Calif.*

FLOWMETER — "Flo-Watch" meter for flow, level, pressure, temperature or position is precision mechanical meter designed to meet requirements for metering boiler feedwater and steam output as well as main distribution lines. While illustration below shows recording and totalizing instrument with 10-in. indicating scale above chart, unit is also furnished as recording or indicating instrument only, or as recording and totalizing instrument with or without pen pointer or segmental indicator. All recording instruments have evenly graduated flow charts and all integrating instruments have positive-drive, 7-digit, straight-reading counters of cylometer type. *Builders Iron Foundry, 7 Codding St, Providence, R. I.*



1 PNEUMATIC SYSTEMS—Taylor remote pneumatic transmission system utilizes standard Taylor instruments, and is useful in correlating temperature, pressure, flow or liquid-level data on a centralized panel or in a control room. May consist of one or two transmitters connected to a receiver; or one or more receiving instruments, not necessarily near each other and as far as 1000 ft from transmitter. Transmitters or receivers may be indicating, recording or controlling types. Air pressure is transmitting medium, with ¼-in. copper tubing as means of connection. Speed of response of receiver to changes in output air pressure is largely dependent upon distance, maximum lag being one second per 100 ft of tubing. *Taylor Instrument Cos, Rochester, N. Y.*

2 LOAD ANALYSER—Knopp analyser provides in one instrument means for accurately measuring power factor of individual loads as large as 12,000 to 48,000 watts, depending on voltage range. Makers state that instrument is suitable for measuring power factor on all sizes of fluorescent lighting equipment. For measuring very large amounts of power beyond range of instrument, analyser can be used to advantage in secondary of metering transformers. *Electrical Facilities, Inc, 4224 Holden St, Oakland, Calif.*

3 STACK THERMOMETER—Flue-gas temperatures can be measured by fitting all-metal thermometer into sleeve holder, which in turn holds thermometer stem in horizontal position in center of flue-gas stream. Has temperature range from 200 to 1000 F, with accuracy guaranteed by maker within 1%. *Weston Electrical Instrument Co, 614 Frelinghuysen Ave, Newark, N. J.*

4 TIME CYCLE CONTROLLER—"Flex-O-Timer" is adaptable for all-electric, all-pneumatic operations or combinations of both. New latch-trip solenoid-operated mechanism starts process instantaneously. This actuates one or more snap operators to start timer motor and any outside electrical or pneumatic functions to be performed simultaneously at start of operation. *Taylor Instrument Cos, Rochester, N. Y.*

5 PRESSURE REGULATOR—Single-seated reducing regulator is auxiliary operated. In operation, main valve, when direct seated, is held open by spring tension and closed by inlet pressure on diaphragm. Pilot valve is installed in bleed-off connection of main valve diaphragm, with a line from reduced-pressure side connected to pilot valve diaphragm. *McAlear Mfg Co, 5 Western Ave, Chicago, Ill.*

6 PRESSURE REGULATIONS—Foster pressure-reducing regulator, Type 39-Q1, is single seated, and built for initial pressures up to 2500 lb psi, and temperatures up to 1000 F. Can be adjusted for reduced pressures from 5 lb to up to within a few pounds of initial pressure simply by changing dome load. Pressure regulated by valve can be adjusted at distant control point conveniently located by installation of extension loading tubing for hand pumping or by pilot control valve where air supply is available. *Foster Engrg Co, 109 Monroe St, Newark, N. J.*

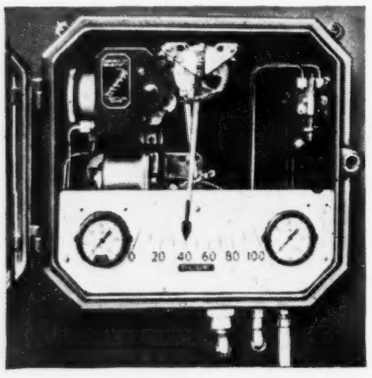
CONTROL INSTRUMENTS — Improvements include new, more compact amplifying pilot of high capacity; rearrangement of control assemblies so that all working parts, including gages, may be installed or removed as a unit; rigid aluminum chart plate, and others. Features of earlier models have been retained. *Mason-Neilan Regulator Co, 1186 Adams St, Boston, Mass.*

FREQUENCY LOAD CONTROL—Equipment includes frequency regulator, load-division regulator, time-error compensator, master clock and accessories. Frequency regulator is extremely sensitive device, says maker, of simple and rugged construction. Load-division regulators are similar to frequency regulators except that they are responsive to active power, rather than frequency. Time-error differential device is system of gears which acts to correct any errors in timing between master clock and electrical system by applying proper bias to point-centering springs. Accessory equipment includes transformers, reversing switches, transfer switches and resonant filter. *Burlington Instrument Co, 301 N Main St, Burlington, Iowa.*

OXYGEN ANALYSER—Instrument introduces new principle in measurement and is designed for permanent installation and continuous operation. Recorder supplies precise measurement of oxygen concentration from 0 to 15% and can be calibrated for any range between these limits. *Mine Safety Appliances Co, Pittsburgh, Pa.*

PRESSURE REGULATOR—Type P212A electric static-pressure regulator is designed for use with motorized damper, or similar device, to control static pressure in discharge duct of fan system, to control overfire draft in a combustion chamber, or similar applications where definite static-pressure conditions are to be maintained. *Minneapolis-Honeywell Regulator Co, 2247 Fourth Ave S, Minneapolis.*

FLOWMETER—"Linameter" is adaptable to measurement of fluids having characteristics of viscosity, corrosiveness and solubility such as fuel oil, ammonia, hot tar, etc. Meter contains weighted disk positioned by velocity of fluid through a tapered throat section in such a manner that disk-travel is directly proportional to flow-rate. Coils form a reactance bridge when connected electrically to similar coils in indicating, recording and integrating instrument and form means of transmitting measurement any distance from meter body. *Cochrane Co, 17th St and Allegheny Ave, Philadelphia, Pa.*



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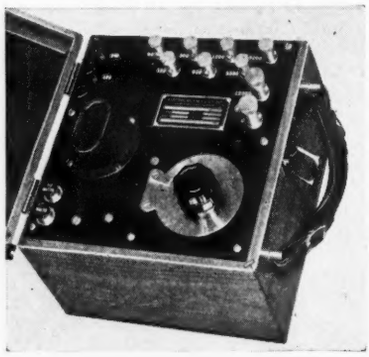
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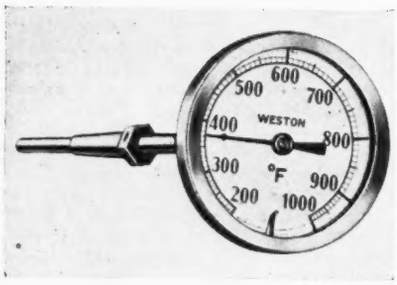

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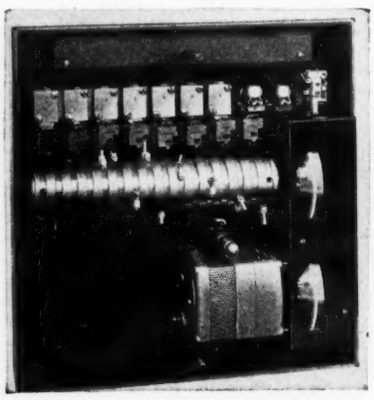
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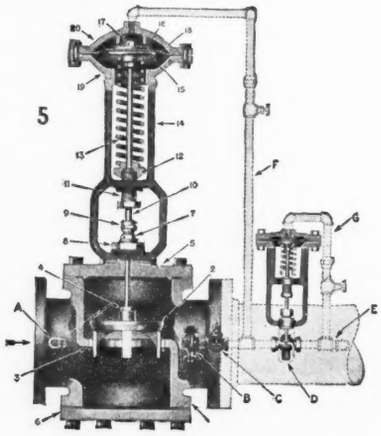

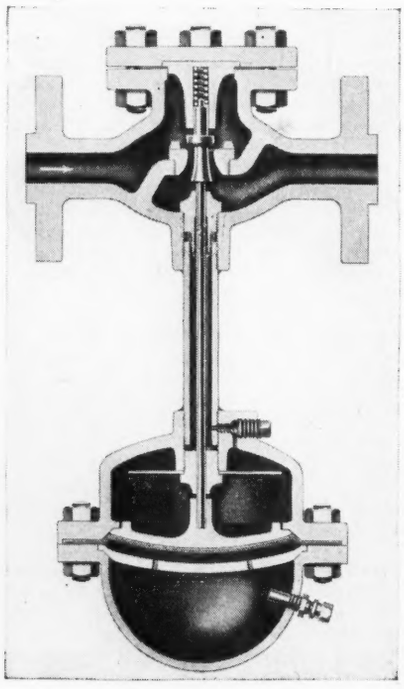
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MISCELLANEOUS

1 LOCK NUT—"An-Cor-Lox" is all metallic, double-chamfered nut made in one unit. Nut is spun on bolt and drawn up to desired torque after it hits work. Soft metal washer expands into root of bolt thread and is compressed against nut rim, securely locking nut to bolt, not to work. *An-Cor-Lox Div, Laminated Shim Co, Glennbrook Station, Conn.*

2 WATER-REFINING UNIT—Mobile units for U S Army and Marine Corp use have capacity of 100 and 50 gpm respectively. Each unit, mounted on trucks and trailers, has gasoline-driven centrifugal pump, direct gas-fed chlorinator-soda ash feeder, alum feeder, and filter. Also equipped with instruments for proper control, interconnected piping and metal-reinforced rubber hose. *American Water Softener Co, Philadelphia, Pa.*

3 WHITEPRINT MACHINE—Model F printing machine features newly developed high-pressure mercury-vapor tube for light source, which uses 40 watts to inch and provides uniform light over entire printing area. Original and sensitized material are brought into exposure by carrier belts which hold them against 4¼ in. diameter glass cylinder. Cylinder, tracing and sensitized material revolve at same speed, eliminating slipping and distorted prints. Mechanically-controlled ammonia vapors develop exposed prints, rubber belt carrying print over perforated top of developing tank. Print-return chute delivers finished print to front of machine dry and ready for use. *Ozalid Corp, Johnson City, N. Y.*

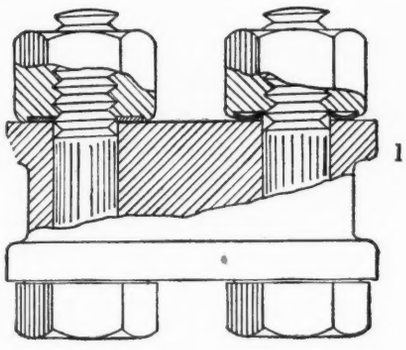
4 PHOSPHATE COMPARATOR SET—Betz Junior set uses adaptation of colorimetric method of determining soluble phosphate. Regularly furnished with two standards, 30 to 60 ppm, permitting control of phosphate within that range. Other standards, of 20 and 40 or any other specified, can be furnished. Consists of wooden cabinet, removable comparator block with 2 permanent (maximum and minimum) color standards, 2 graduated mixing tubes with rubber stoppers, 2 graduated test tubes, one 20-cc vial and graduated pipette, 1 extra graduated pipette and nipple, one 20-in funnel with extra long stem, 1 box filter paper, one 16-oz bottle Molybdate reagent, one 1-oz bottle stannous chloride (concentrated), together with instructions. *W H & L D Betz, 234 W Wyoming Ave, Philadelphia, Pa.*

5 DUST COLLECTOR—"Cyclone" separates dust from air stream by centrifugal force, and, according to maker, high efficiencies are obtained with relatively low backpressure due to careful proportioning. Air volume can be varied from rated capacity without changing efficiency, says manufacturer, but backpressure changes as the square of the volume ratio. Dust hopper, or storage tanks, can be any design, providing they will handle efficiently capacities of dust to be collected. Dust collection can not be permitted in collector proper. Dust discharge must be taken care of either while collector is in operation, or hopper must be supplied with double-stage continuous discharge valve. *American Foundry Equipment Co, 580 South Byrkit St, Mishawaka, Ind.*

BONDING PROCESS—Soft rubber and Neoprene can be bonded to steel and aluminum with high adhesion strength between rubber and metal, according to manufacturer. By chemical process, composition of rubber is modified in such a way that it will attach itself integrally to metal and still retain its capacity to vulcanize itself to outer rubber layer. "Dura-Bond" process is limited to application where temperatures will not exceed 200 F. Has adhesion strength of 500 to 700 psi. *Hewitt Rubber Corp, Buffalo, N. Y.*

RUBBER COMPOUND—Synthetic compound is said to retain its adhesion, elasticity and water-proofing qualities. Compound contains no disintegrating resins, asphalt or putty, and is applied cold with gun or trowel. Watertight, it is said to adhere to wood, stone, brick, concrete, metal, glass, etc. *American Bar Lock Co, Ablo Products Div, Long Island City, N. Y.*

FLUORESCENT LAMP DIFFUSER—P F C Plastic diffuser snaps on over bare fluorescent lamps. Available for 1 and 1½-in thick lamps



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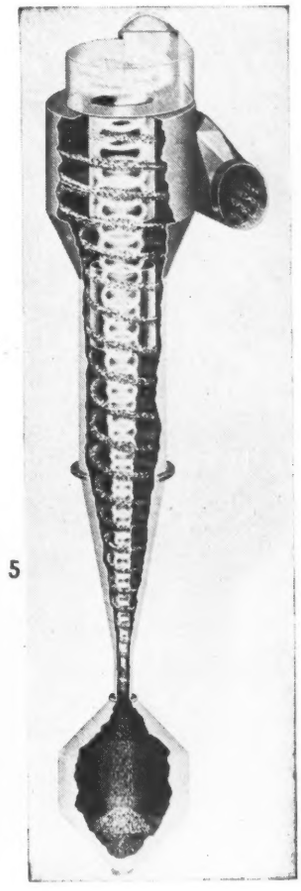

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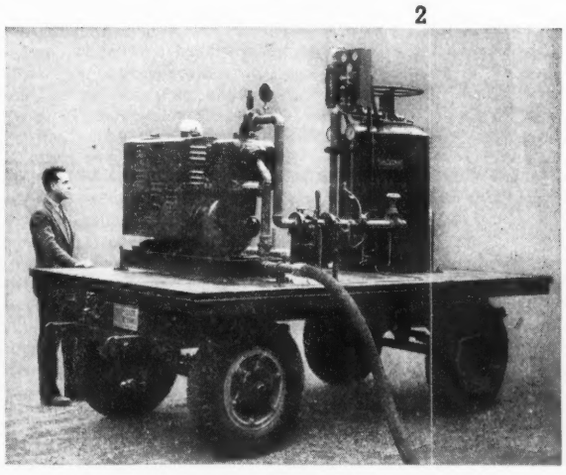

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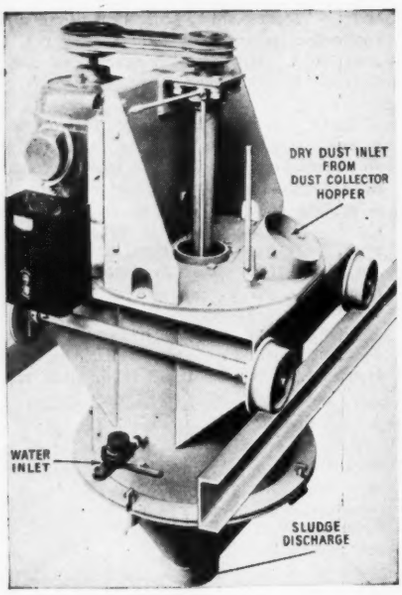

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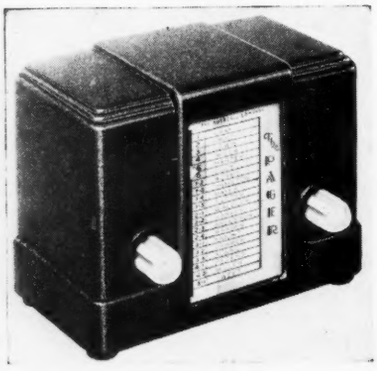

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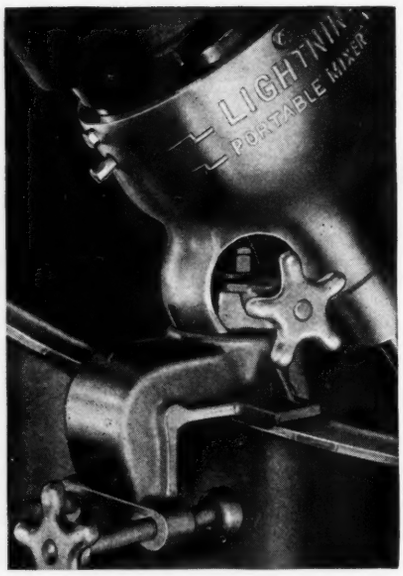
in 5 colors: white, light blue, yellow, pink and pale green. Plastic construction makes diffuser shatterproof. *Edwin F Guth Co, 2615 Washington Blvd, St. Louis, Mo.*

1 DUST-DISPOSAL UNIT—American wet disposal unit is designed for wetting and mixing with water or other liquids, collected dust discharged from hoppers of cloth-type or other dry types of dust collectors. Unit is self-contained mixer which receives dry dust from the collector hopper and deposits it near center of high-speed mixing disk. At same time, water or other liquid is discharged at disk center. Speed and shape of disk causes instantaneous mixing of dust and liquid, and mixture flows from sludge discharge at bottom of unit. Unit will handle dust approximately as fast as hopper can be emptied dry. Quick coupling allows rapid connections to regular hopper valve through flexible canvas spout. *American Foundry Equipment Co, 580 South Byrkit St, Mishawaka, Ind.*

2 CODE-SENDING STATION — "Pager" sending station transmits codes to locate from one to 20 persons. Numbers are assigned to persons wanted most frequently, and instrument is then dialed to party wanted. This transmits audible tone, simultaneously, to all departments. Signals may be obtained in musical chimes, mellow-toned bells, or sharp and insistent gongs. *Autocall Co, 126 Thomas Ave, Shelby, Ohio.*

3 MIXING CLAMP—Hand clamp for adjusting "Lightnin" portable mixers operates by hand wheel, which locks mixer into any selected position for any mixing action. Feature is patented double-wedge with hand wheel which tightens unit firmly. *Mixing Equipment Co, Rochester, N. Y.*



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4 SEPARATOR—Gale conditioner can be used, according to maker, wherever lubricants, fuel oil or other liquids are used in manufacturing or storing and where there is a loss from leaking, etc. Unit also said to remove other substances such as coal, minerals, particles, and to condition water. *Gale Oil Separator Co, Inc, Chrysler Bldg, New York, N. Y.*

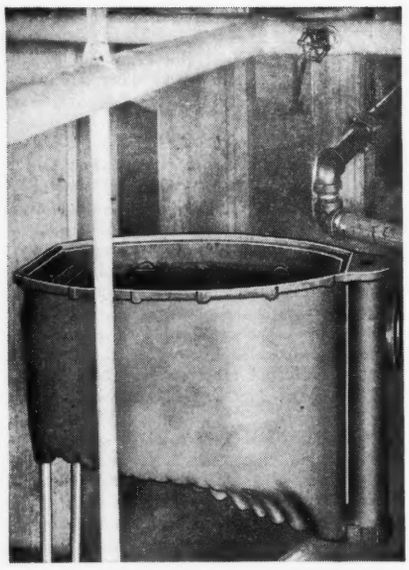
5 EMERGENCY LAMP—Model Sr 100 is a light for locations where no electric current is available or where hazardous atmosphere exists in regard to long power extensions. All joints between parts of battery case, lamp and lens, etc, are sealed and spillage of acid from battery is prevented by special design of battery plates involving principle of capillary action. *Stewart R Browne Mfg Co, Inc, 7376 Grand River, Detroit, Mich.*

"STOP-LEAK" MATERIAL — "Flexite" is used with ordinary Portland cement, and in operation is forced against water pressure, held for a few seconds, and leak is stopped. Typical applications include stopping leaks in concrete tanks, etc. *Flexrock Co, 23rd & Manning Sts, Philadelphia, Pa.*

SOLDERING PASTE — "Meltomatic" paste solder is brushed on metal only where needed, can be heated with gas or other flame, electricity, hot oil, or in furnace. Will melt at a temperature slightly higher than 400 F. Said to save time and money, because no material is wasted, can be applied without usual equipment for soldering and makes stronger bond. *Wayne Chemical Products Co, Detroit, Mich.*

MERCURY LAMP TRANSFORMER—Added to line of present transformers, new unit is designed to operate two 400-watt mercury lamps. Weatherproof pole mounting units have terminals accessible at bottom; three threaded hubs included so that up to 3-fixture mounting supports may be used. *Jefferson Electric Co, Chicago, Ill.*

LOCK NUT—Security lock nut can be tightened up or backed off part way, according to maker, and still retain its grip on bolt. When nut is applied, elliptical spring-steel retainer is distorted from elliptical into circular shape, setting up powerful spring pressure between bolt threads and retainer threads. *Security Metal Products, Inc, 331 East Kalamazoo Ave, Kalamazoo, Mich.*



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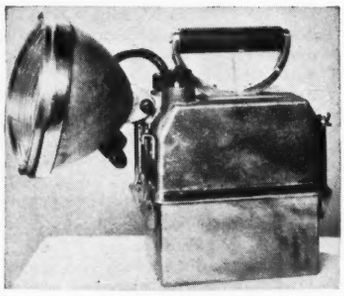

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FIRE EXTINGUISHERS—Buffalo CTC 1- and 2-gallon extinguishers have heavy-drawn brass seamless shells and are pump driven. Units have no outside valves to shut off, and stream stops as soon as pumping stops. Both units have been tested by Underwriters Laboratories. *Buffalo Fire Appliance Corp, Buffalo, N. Y.*

WELDING POSITIONER—Model 12 positioner is new model recently adde to present line. Table is removable for attachment of special jigs or fixtures and is adjustable in height. Power for table rotation can be furnished with either constant or variable-speed drive. *Cullen-Friestadt Co, Chicago, Ill.*

REACTION SOLDER—Method of soldering said to eliminate iron tinning, fluxing and conventional solder bar. Consists of powder, which contains a combination of selected electro-positive metals, with chemicals, to form chemical reaction with metals which it joins. Reaction is fast, depending only on application of relatively low heats. Application: reaction solder is applied to joint in powder or paste form and heat is applied. Said to work with ferrous and non-ferrous metals. *Colonial Alloys Co, Colonial Philadelphia Bldg, Philadelphia, Pa.*

RESURFACER—Improvements in "Ruggedwear" resurfacer is "Chrysotile", a fibrous rock resistant to all ordinary acids, with twice strength of regular asbestos fibres, waterproof and said not to rot or disintegrate. Improvement produces tougher and finer feather edges for finishing. *Flexrock Co, 23rd & Manning Sts, Philadelphia, Pa.*

CONDUCTIVE COMPOUND—Containing colloidal graphite, small amounts of hardenable organic colloid, and hardening agent, coating is used to make fabrics electrically conduc-

(Continued on Page 146)

MOTORS, SWITCHES AND OTHER ELECTRICAL EQUIPMENT

1 DISTRIBUTION TRANSFORMER — New type transformer has several features not found in other types, according to maker. Cadmium-plated 3-way terminals increase wiring flexibility, manufacturer says. Installation can be made with ordinary tools carried by lineman. Tanks are of steel tested under pressure to prevent leakage. Both high- and low-voltage bushings are said to have been designed to eliminate radio interference. Units are available in all standard NEMA ratings. *Allis-Chalmers Mfg Co, Milwaukee, Wis.*

2 CONTROL STATION—Having tongue-and-groove design of seams between enclosure base and cover to make it difficult for dirt and grit to enter, 3-button control station is available for mounting horizontally or vertically. Button mechanism is of unit construction, mounted in die cast box which is open at front end and two sides and has conduit openings at one end. Double-break silver alloy contacts are mounted in individual chambers in molded plastic block to protect them against injury. Unit available with various button markings, including "Forward-Reverse-Stop," "Raise-Lower-Stop," "Up-Down-Stop," "Open-Close-Stop," etc. *Allen-Bradley Co, 1311 S 1st St, Milwaukee, Wis.*

3 MAGNETIC STARTER—Different speeds on across-the-line starters are obtained by changing motor connections to change its number of poles. Starters are available for constant hp, constant and variable torque, and single- and double-winding motors. Features include pushbutton speed selection, accurate overload protection, low-voltage protection, "De-Ion" arc quenchers, and front-of-board wiring with accessible terminals. *Westinghouse Electric & Mfg Co, East Pittsburgh, Pa.*

4 PORTABLE RECTIFIER — "Porto-Rect" units, developed for use with machine tools, use latest-type hot-cathode mercury-arc tubes guaranteed for 2000 hours under normal operating conditions. These have over-all efficiency as high as 90% at full load, and no-load losses are said to be as low as 60 watts. Unit in simplest form consists of a bank of tubes and an auto or isolating transformer. To this is added voltmeters or ammeters as needed, or unit can be equipped with variable-voltage controls. Can be furnished for use on 110- or 220-volt singlephase ac circuits, with 115 or 230 volts, 12 to 19 amp dc output; and for use on 110-, 220-, or 240-volts polyphase ac circuits with 115,230, or 550 volts, any amperage, output. *Cassels Engrg & Machine Co, P O Box 114, Wauwatosa, Wis.*

5 CIRCUIT BREAKER—Type CA compressed-air circuit breaker interrupts arcs on "cross-blast" principle. Arc is drawn between contacts which open in line perpendicular to insulating splitter plates. Compressed-air stream is blown at right angles to the arc and elongated within these plates. Muffler placed at end of arc chute serves to eliminate residual flame and reduces noise. Safety features of air-supply system include cutoff valves that automatically prevent discharge of air from system to faulty breakers, or from breaker tanks to leaky systems, and alarm valve warns of leakage. *Westinghouse Electric & Mfg Co, East Pittsburgh, Pa.*

CURRENT REGULATOR—Type Y-H constant-current regulator comprises regulator and controller-protector switch. Has no moving coils but operates from no load to full load, adjusting its output voltage to varying load conditions without surges on line or lamp circuit and is consequently adjusted instantaneously with changes in load. *Wagner Electric Co, 6400 Plymouth Ave, St. Louis, Mo.*

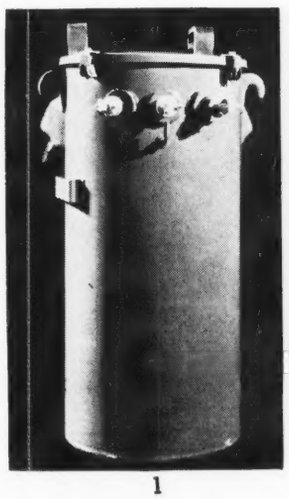
LAMP LOCK—Lamp locks for porcelain and brass sockets, also weatherproof socket with locking device attached. Device for locking electric light bulbs makes use of convolutions on outside of threaded brass ferrule. Large end of tapering coil spring is screwed into socket, leaving three or four turns of spring exposed. Protecting ring with notch in top is dropped over light bulb and bulb screwed into the socket, engaging exposed spring turns in thread on bulb base. *Laduby Co, New Haven, Conn.*

AUXILIARY SWITCH — Electrically-operated switch is used for making and breaking several circuits simultaneously, such as on a differential bus protection system, where several circuit breakers are tripped at once. Two operating arrangements provided as standard. One type can be tripped from front of panel by rotating handle, as well as energizing shunt trip coil. Other type can be tripped only by operating mechanism behind panel. Position of handle shows last switch operation. *Westinghouse Electric & Mfg Co, East Pittsburgh, Pa.*

ELECTRICAL CONTACTS—Contacts are constructed of highly fused pure tungsten metal, assuring uniform grain structure, eliminating any excessive oxidization or pitting during operating periods. Purity of metal guards against film coatings adhering to contact surfaces during time when apparatus is not operating. Further claimed that due to elimination of difficulties electrical contact surface resistance is maintained at a minimum. *Metroloy Co, 57 East Alpine St, Newark, N. J.*

WIRES AND CABLES—"Dilec" wires and cables made with new type fibrous coverings composed of a series of cotton yarns laid side by side in contact relation, overlaid by rayon binder thread. New wires have flame-retarding and moisture-resisting qualities found in other wires made by company, plus new type fibrous covering. Trade name, maker's name, type, size and voltage of conductor are stamped on smooth covering, together with marker every 2 ft to facilitate measuring. *National Electric Products Corp, Pittsburgh, Pa.*

HOOK-ON AMMETER—Type AK-1 hook-on volt ammeter, for measuring alternating current and voltage, can be operated by simply connecting two leads furnished with instrument then flipping switch to desired voltage position on scale. Alternating current can be read immediately by hooking instrument around line. Both insulated and non-insulated conductors can be read in this manner by instrument, which has a C-shaped split-core current transformer. *General Electric Co, Schenectady, N. Y.*



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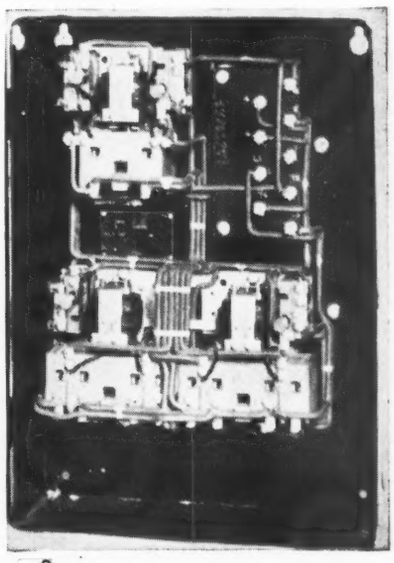

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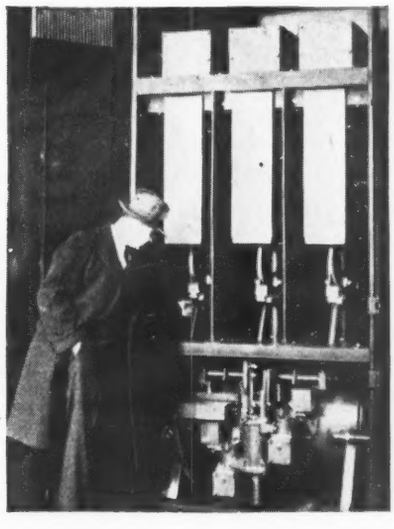

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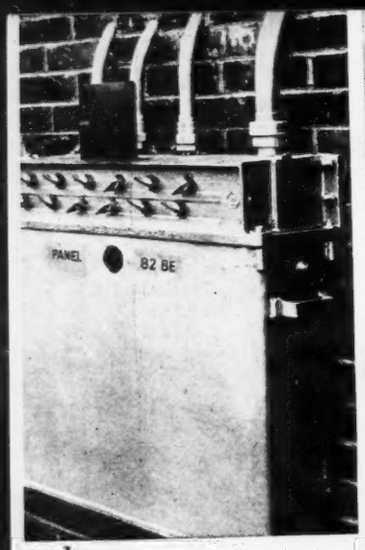

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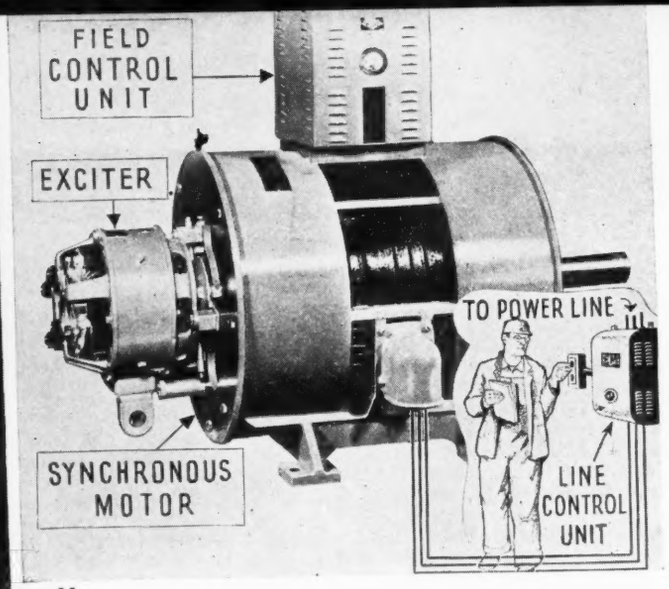

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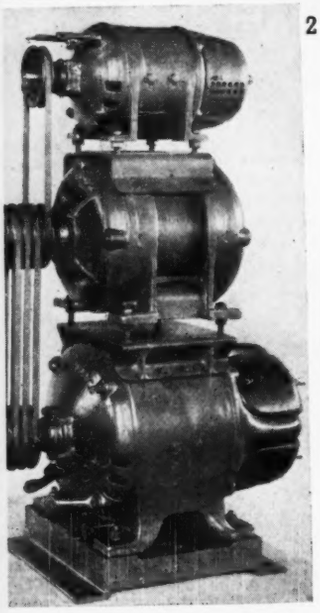

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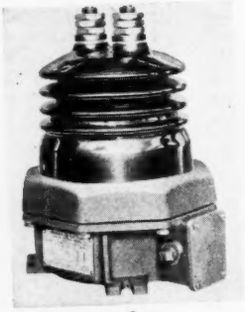

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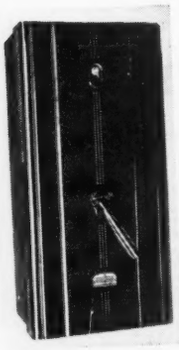

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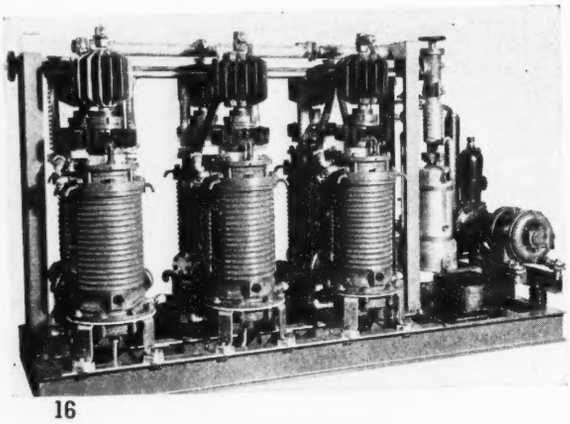

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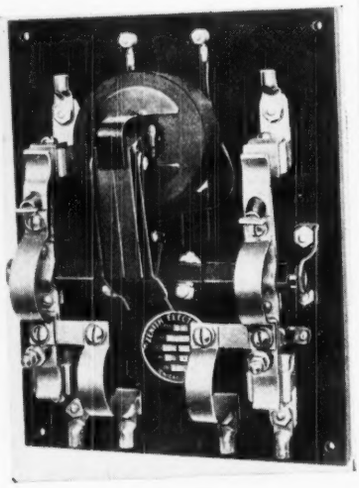

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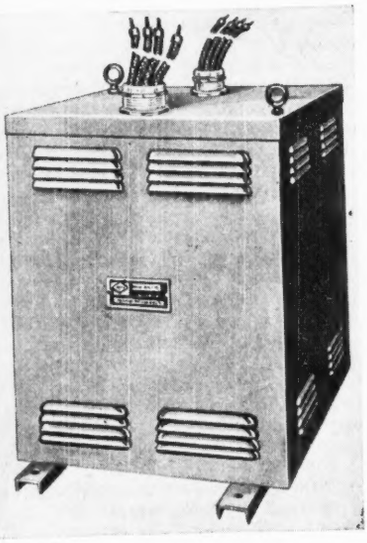

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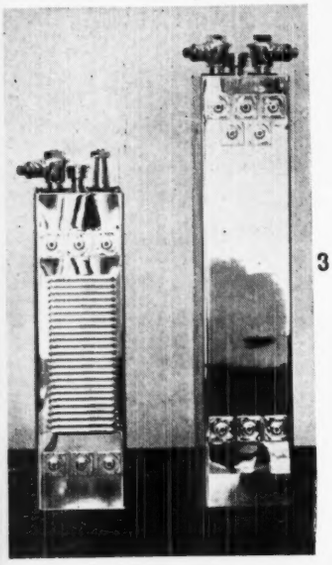

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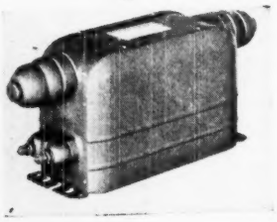

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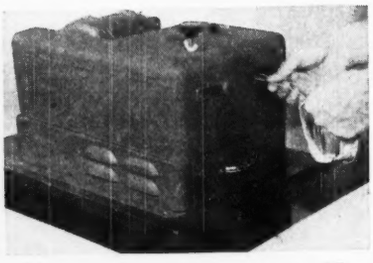

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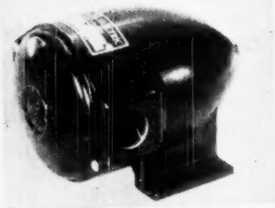

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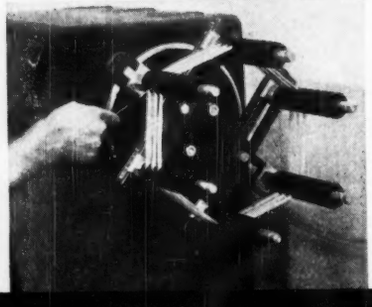


1 LIGHTING PANELBOARDS — Oil-immersed panelboards, using thermal-trip branch circuit breakers, protect lighting circuits exposed to corrosive elements and explosion-hazardous atmospheres. Breaker is compensated within commercial limits, permitting zero to 10% increase in rating when surrounding oil temperature is 140 F. *Westinghouse Electric & Mfg Co, East Pittsburgh, Pa.*

2 MOTOR-GENERATOR SET — Generator is mounted on top of induction motor, attached with base plate, and exciter is mounted in same way on generator. Generator and exciter are V-belt-driven by motor, adjustment being by generator- and exciter-base plates. *Allis-Chalmers Mfg Co, Milwaukee, Wis.*

3 STORAGE BATTERY—D-type cell for use where increased power and capacity are required and where floor space is limited for battery. New type cell, right in illustration, is about one-third higher than C-type. *Edison Storage Battery Div, Thomas A Edison, Inc, West Orange, N. J.*

4 DEFINITE TIME - STARTER — Type CR4052-A1A starters are mounted on molded Textolite base with a Class 115 starting resistor on the back. Unit is dc definite-mechanical-time starter for general purpose constant-speed motors where jogging is not required. *General Electric Co, Schenectady, N. Y.*

5 SECTIONALIZED MOTOR CONTROL—Cubicles built on same principle as modern sectional filing cabinets provide neat, safe enclosures for all usual motor-control devices. No supporting structure or building preparations are required; units are assembled with bus and wiring interconnections already made, or with provisions for wiring on the job if desired. 32 sizes available include eight widths, four heights, for mounting any combination of controllers, disconnect switches or accessories. Controllers can be mounted both front and back for double-sided compactness. *Cutler-Hammer, Inc, 1358 St Paul Ave, Milwaukee, Wis.*

6 OUTDOOR CURRENT TRANSFORMER —Pyranol-filled outdoor current transformer is porcelain-shell type, adaptable for either horizontal or vertical mounting. High-voltage terminals are threaded studs mounted on top of porcelain shell, and secondary terminals are fixed studs inserted in compartment in base and sealed in glass at point where they enter tank. Pyranol is non-inflammable insulating liquid with high dielectric strength, and is hermetically sealed in tank. *General Electric Co, Schenectady, N. Y.*

7 CIRCUIT BREAKERS — General utility circuit breaker for enclosure, panelboard, or switch-board mounting is rated from 50 to 100 amp at 25 and 600 volts ac, 125, 250 volts dc, and is adaptable to lighting and feeder circuits and motor branch-circuit protection. All breakers in new series use 100-amp frame, permitting physical interchangeability, and have new magnetic trip. *General Electric Co, Schenectady, N. Y.*

8 LUMINOUS - TUBE TRANSFORMER — "Streamliner" transformer available in secondary ratings from 6000 to 15,000 volts. Features include high-voltage bushings, which are water-tight and free from internal corona, and new insulating compound, said to have high dielectric strength, high heat conductivity and high flow-point. *General Electric Co, Schenectady, N. Y.*

9 PLUGGING SWITCH — Alnico magnet used as fundamental part of plugging switch for controlling motor stopping eliminates frictional parts or clutches. In operation, driven rotor produces rotating magnetic field which induces eddy currents in walls of aluminum cup. Magnetic reaction produced by eddy currents turns cup through limited rotation, and contacts are operated by Textolite rod which connects cup and movable strip. As speed of motor decreases, definite point will be reached where spring force will overcome magnetic force; this is tripping point. Changing spring tension provides easy means of adjusting tripping point over definite range. *General Electric Co, Schenectady, N. Y.*

10 CIRCUIT BREAKER — Designed primarily for protection of lighting, appliance, and motor circuits in buildings, stores and factories, unit combines in single unit a cooperative magnetic and thermal trip. Available in ratings of from 15 to 35 amp, single-pole only, 250 volts ac and 125 volts dc. *Westinghouse Electric & Mfg Co, East Pittsburgh, Pa.*

11 PACKAGED SYNCHRONOUS MOTOR —High-speed synchronous motor consists of fabricated, all-steel motor, exciter mounted on top of and V-belt driven by motor, and field control unit, mounted on motor, for automatically applying and removing excitation for field winding of synchronous motor. Units available up to 350 hp at 1800 rpm. *Electric Machinery Mfg Co, 1331 Tyler St, N E, Minneapolis, Minn.*

12 LINE STARTER — Improvements in across-the-line starter for control and protection of polyphase squirrel-cage motors are: cover can be removed for easy installation, interior of case finished in light aluminum to aid in making connections, loosening of one screw permits easy removal of operating mechanism, and C-H overload relay has been made smaller in size, more accessible, with better operating characteristics. *Cutler-Hammer, Inc, 1358 St Paul Ave, Milwaukee, Wis.*

13 TRANSFER SWITCH—Automatic transfer switch, spring-gravity drop-out type, is for automatically connecting lighting or power load to emergency source in case of failure. Available for standard voltages 110 to 120 or 208 to 240 volts, 25, 50 or 60 cycles, and 115 or 230 volts, dc. Switch will transfer when voltage of circuit drops to 70% or less and will restore the load to normal source when voltage reaches 90%. *Zenith Electric Co, 845 S Wabash Ave, Chicago.*

14 WIRE STRIPPER—Ideal No. 9-C strips cotton and enamel, silk and enamel, string, asbestos, and other light insulations from round, flat, rectangular solid or stranded wire. Operation of stripper is from ¼-hp motor to special steel wire brushes, speeds of which are synchronized through auxiliary flat-belt drive which also operates vacuum exhaust. *Ideal Commutator Dresser Co, 1025 Park Ave, Sycamore, Ill.*

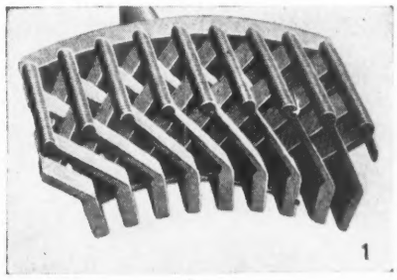
15 COIL-WINDER DRIVE—"Ideal" coil-winder drives have variable-speed transmissions, sealed ball bearings, and V-belt drive without gears. Infinite number of driving speeds available, together with brake, which goes into operation when operator removes foot from starting pedal. Handwheel on shaft provides means of hand-turning coils if desired. *Ideal Commutator Dresser Co, 1025 Park Ave, Sycamore, Ill.*

16 POWER RECTIFIER—"Excitron" rectifier is single-anode type. Instead of having numerous anodes in one vacuum chamber, unit has six individual chambers, each with single anode and corresponding cathode. Frame which usually holds six tanks also supports vacuum pumping equipment which is connected to tank through a vacuum pipe manifold. Arc-ignition and control equipment also mounted on this frame. *Allis-Chalmers Mfg Co, Milwaukee, Wis.*

17 AIR-COOLED TRANSFORMERS—Line of transformers is now made in 15- and 25-kva sizes. These ratings can be supplied in insulated types, with primary voltages of 575, 230/115 or 460/230 and secondary voltages of 230/115. Construction features include full air-draft ventilation, specially wound, hand-finished coils, and cores of thin-gage low-loss steel. *Acme Electric & Mfg Co, Cleveland, Ohio.*

18 PRESSURE PADS—Resilient pressure pads for holder-end of brushes made to offset injurious effects of vibration on carbon brushes and are secured to holder end at point of contact with pressure finger. Form of pad and location on brush is dependent on shape and dimensions of pressure finger and location of contact with brush. *National Carbon Co, Inc, Cleveland, Ohio.*

CAST ALUMINUM ROTOR—"Valv-Amp" rotor is constructed for use in larger sizes of double-squirrel-cage motors for high starting-torque, low starting-current service. Makes use of unique shape of rotor slot and special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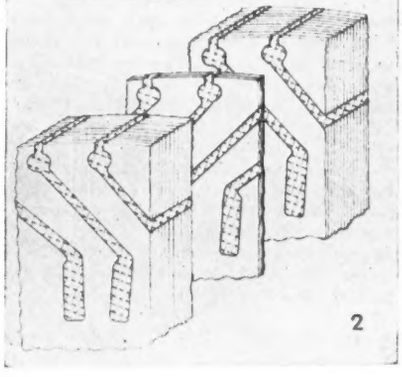
method of assembling rotor punchings to control flow of starting current. Result is that, without switch or other moving parts, current is permitted to flow in outer squirrel-cage when motor is started, producing high starting torque. Then, when motor comes up to speed, current is allowed to flow through entire winding. Rotor is unique in that neck which connects inner and outer cages is substantially discontinuous longitudinally through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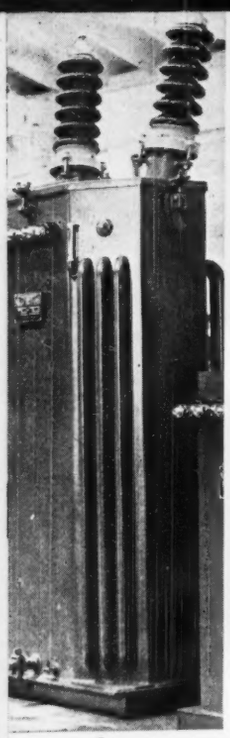
the rotor. In construction shown, neck is oblique, rather than radial, as in conventional-type slot. By special arrangement of punchings during assembly, axial continuity of connecting neck is broken up, photo No. 2, which is equivalent to having a magnetic switch built in rotor itself. When rotor-current frequency is high, this switch is closed and no current flows through connecting neck. As motor comes up to speed, magnetic valve opens and current flows in this section. *General Electric Co, Schenectady, N. Y.*



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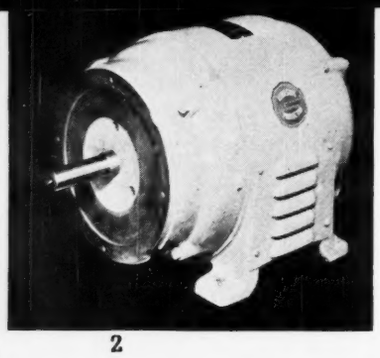

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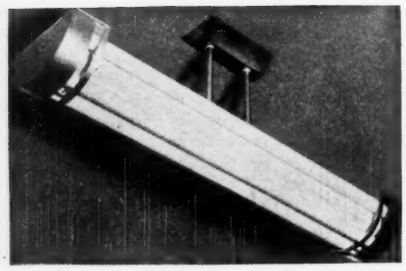

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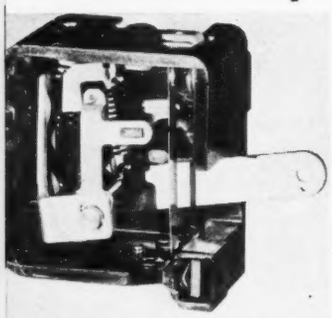

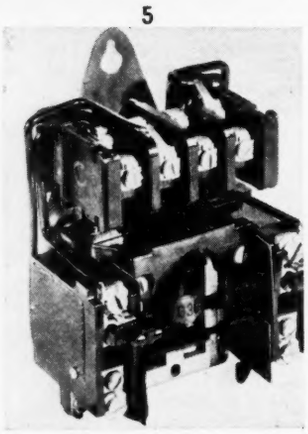

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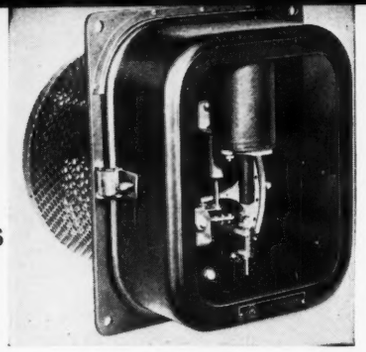

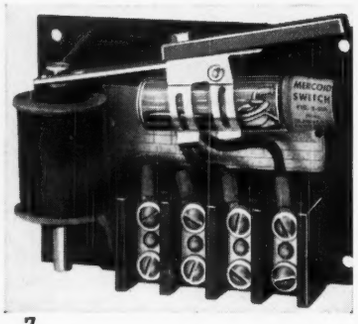

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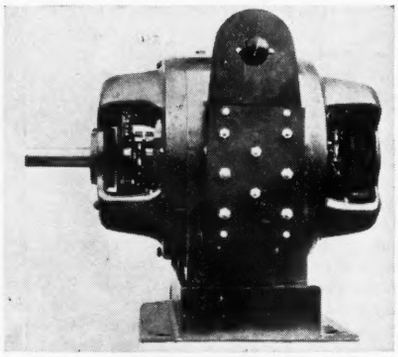

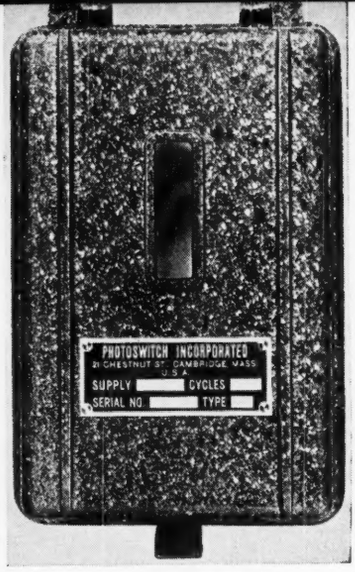

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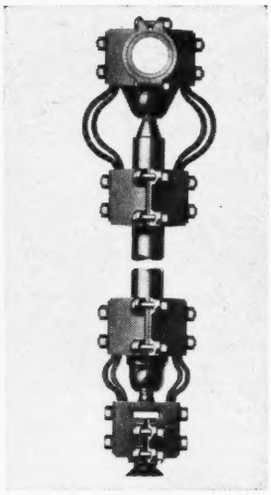


1 TRANSFORMER — Niagara transformers have coils designed to provide maximum dissipation of heat by means of well-circulated oil. These coils are dried in electrically heated and controlled ovens and then vacuum-dried to remove all air and moisture. Cores are insulated from coils and frame by heavy pressboard. Tanks are fabricated from non-scaling steel and each style is designed to provide ample room for bushings and accessories. When completed, they are tested by being filled with transformer oil and allowed to stand for 24 hours. They are then cleaned and sprayed with oil-resisting paint. *Erie Electric Co, 124 Church St, Buffalo, N. Y.*

2 MOTOR SHIELDS — "Unimount" end shields have flat surface to facilitate mounting of pumps and other direct-driven equipment, and are available with all company motors. Shield eliminates necessity for adapter, saves mounting time and conserves space. *U. S. Electrical Motors, Inc, 200 Slauson Ave, Los Angeles, Calif.*

3 FLUORESCENT UNIT—Miralume HF-200 comes complete with four 40-watt (48-in.) lamps, and all wiring and fittings. Unit is corrected for power factor, and stroboscopic effect is practically eliminated, says maker. Units are designed for 110–125 and 220–250 volts, and can be installed in any 60-cycle ac circuit. *Hygrade Sylvania Corp, Salem, Mass.*

4 FLOAT SWITCH — Designed specifically for sump-pump control, switch is single-pole type employing overcenter toggle mechanism. Other features of switch include corrosion-resistant parts in mechanism which permit operation under severe moisture conditions, accessible terminals for easy wiring and snap-action mechanism. *General Electric Co, Schenectady, N. Y.*

5 MAGNETIC SWITCH—New size and type magnetic switch available for use with single-phase motors up to 1 hp, 110 volts, and 1½ hp, 220 volts, or polyphase motors up to 1½ hp, 110 volts, and 2 hp, 220–600 volts. Magnet of switch is E-type, with three sealing surfaces to decrease hammer blow in closing and to increase life of magnet. *General Electric Co, Schenectady, N. Y.*

6 VOLTAGE REGULATOR — Rocking-contact voltage regulator controls small ac and dc generators. Has no vibrating contacts, tubes or other parts requiring replacement or readjustment at frequent intervals. Consists of sensitivè solenoid-actuated plunger which acts on a main shaft, rocking a special contact sector over inner surface of commutator, segments of which are permanently connected to regulating resistance. *Allis-Chalmers Mfg Co, Milwaukee, Wis.*

7 RELAY—Designed for panel mounting and recommended for control of motors, valves, electric heaters, etc, relay is said to be simple in operation. Plunger-type solenoid actuates a tilting arm to which the mercury contact switch is attached. When coil is energized, plunger floats within plunger-guide tube. Opening of solenoid pilot circuit or current failure causes plunger to drop by gravity. Available for any voltage between 6 and 230 volts, ac or dc. *Mercoid Corp, 4203 Belmont Ave, Chicago, Ill.*

8 POWER CONVERTER — Katolight dc motor operates both as dc motor and provides ac current for small jobs. Motor is built with slip-rings for ac take-off on one end. Typical application of unit is on spot-welding transformers, when used in direct-current areas. *Kato Engrg Co, 101 Elm St, Mankato, Mich.*

9 PILOT RELAY—Photoswitch electronic relay is switch making possible control of large currents by delicate mechanism, liquids or extremely light contact pressure. Control is effected by delicate touching of two wires or contacts, or by their being short-circuited by a liquid or moist material. *Photoswitch, Inc, 21 Chestnut St, Cambridge, Mass.*

10 CONNECTORS—Burndy electrical connectors, Types XTBS and XDBS, permit expansion and contraction of a tap conductor at angle to overhead bus or transformer stud. Provide completely universal joint with ball-and-socket alignment guides incorporated in both stud connector and flexible-T-connector. *Burndy Engrg Co, 459 East 133rd St, New York, N. Y.*

11 START-AND-STOP DEVICE—Designed to eliminate waste incurred from frequent idling of arc welder between jobs, device keeps generator running only while operator touches work with electrode. When welding is interrupted, machine stops automatically after short time delay. For use only on Hornet model welder, device is operated by replacing handwheel on machine with reversible-motor-driven remote-control device. *Wilson Welder & Metals, Inc, 60 East 42nd St, New York, N. Y.*

12 ELEVATOR DOOR CLOSER — Otis 4-PB door closer and electric interlock is designed for operation of sliding hoistway

doors used with automatic elevators. When car stops at landing, car cam is automatically projected against sill mechanism. This lifts push rod, see illustration. Push rod in turn lifts latch from engagement with door closer arm, and door may be opened. Being directly connected to interlock switch, movement of latch first opens interlock switch, preventing movement of elevator, then unlocks door. *Otis Elevator Co, 260 11th Ave, New York, N. Y.*

13 CONDULETS—Form 8 series condulets have wiring chamber wider and longer than other condulets of comparable size, and have extra-wide surface for gasket between condulet and cover. Blank sheet-steel and cast-alloy covers are made for all sizes, and blank Bakelite covers may be drilled, where more than five wire holes are desired. *Crouse-Hinds Co, Syracuse, N. Y.*

14 CLOSING RELAY—Type HKA pump-free control relay is for oil circuit breakers equipped with cut-off switches. Consists of two elements, operating and auxiliary. Former picks up and closes its main contacts for closing solenoid and at same time seals itself in. *General Electric Co, Schenectady, N. Y.*

15 FLOW SWITCH — McDonnell flow switch employs positive mechanical action to start a pump, alarm or any other electrical device when flow through a pipe starts or stops. Consists of long flexible paddle extended into pipe. When this paddle is forced back by flow in pipe, it closes electrical circuit and starts whatever machinery switch controls. *McDonnell & Miller, Room 1305, Wrigley Bldg, Chicago.*

16 FUSES—"Hi-lag" fuses have, according to maker, higher lag on starting loads. Also has 1-piece link, spring-tension contact, and simplified construction. Double-bridge assembly easier to renew than overload, says maker. *Ware Brothers, 4500 W Lake St, Chicago, Ill.*

17 LIMIT SWITCH—Solving problem of how to seal a moving part from corrosive gases or liquids, engineers of company used Neoprene diaphragm as part of limit switch. Switch had to be sealed completely, so same composition was used as a gasket between parts. Switch shown has plunger extending from top. Seal, in form of a cap, has hole through which plunger passes, remaining boot insuring positive seal. *Micro Switch Corp, Freeport, Ill.*

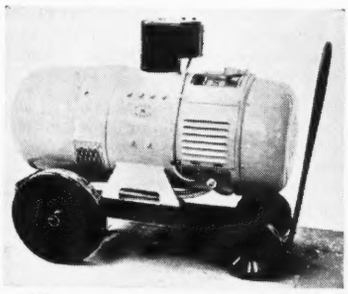
18 ELECTRIC MOTOR—"Lo-Amp" motor is especially designed for use on refrigerating and air-conditioning installations. Motor has low locked rotor current and can be supplied with either low or high starting torque. Curves 1 and 2 on chart show inrush current and starting torque on "Lo-Amp" motor as compared with corresponding data on standard double-deck squirrel-cage motor. *Louis Allis Co, Milwaukee, Wis.*

CONTACTORS—540 line of heavy duty contactors available in 100-, 150-, 300-, 600-, 1200-, and 1800-amp sizes, and has two new features. These are heavy duty shields for arcs with Carbofrax inserts opposite contact tips and design and construction of electric interlock. *Cutler-Hammer, Inc, 1358 St Paul Ave, Milwaukee, Wis.*

MOTORS—Vertical, single-phase motor announced in sizes from ¾ to 5 hp. Solid or hollow shaft modifications can be furnished. All 1800 and lower speed motors built as repulsion-start induction-run motors, which start as repulsion motors with two brushes shorted. 3600-rpm ratings differ in that they do not require short-circuiting device in armature. *Fairbanks, Morse & Co, Chicago, Ill.*

CIRCUIT BREAKER—Type KB circuit breaker is new model of type K breaker, with several improvements. Unit is 3-pole, 600-amp unit mounted in individual pull-box steel enclosure. Direct-acting overcurrent trip is obtained by use of trip-coil, which carries all the current in circuit and operates tripping mechanism at required setting. *I T E Circuit Breaker Co, 19th & Hamilton Sts, Philadelphia, Pa.*

MOTOR SHUNT BEAD—Glazed ceramic motor shunt bead is made of AlsiMag, and has perfectly smooth inside area lubricated by a glazed coating. Said to give all advantages of glass bead with none of its disadvantages. *American Lava Corp, Chattanooga, Tenn.*



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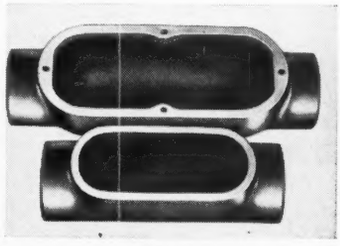

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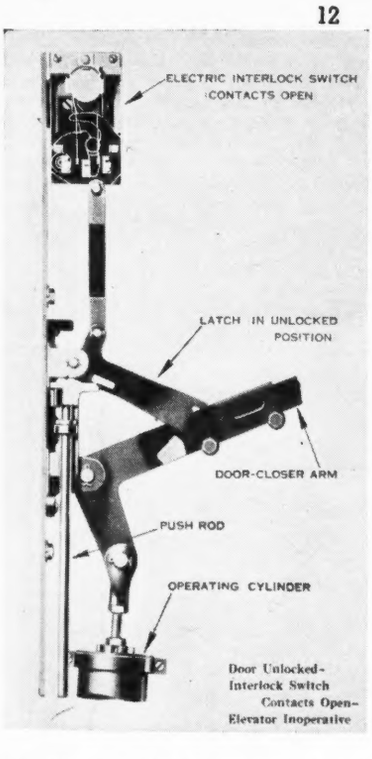

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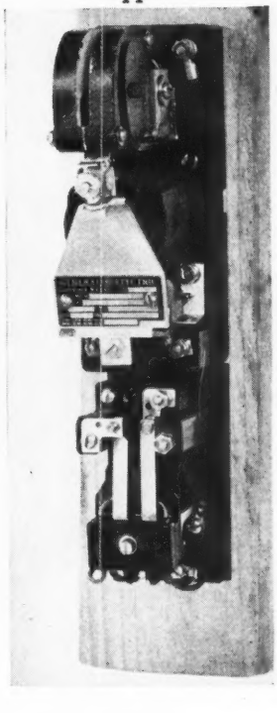

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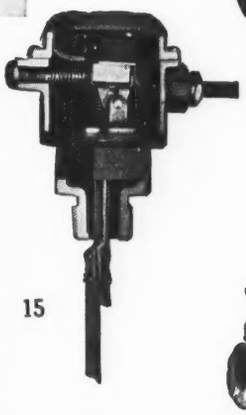

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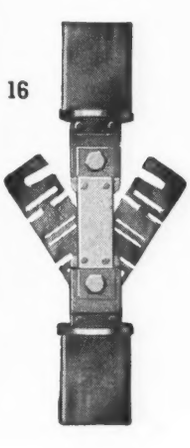

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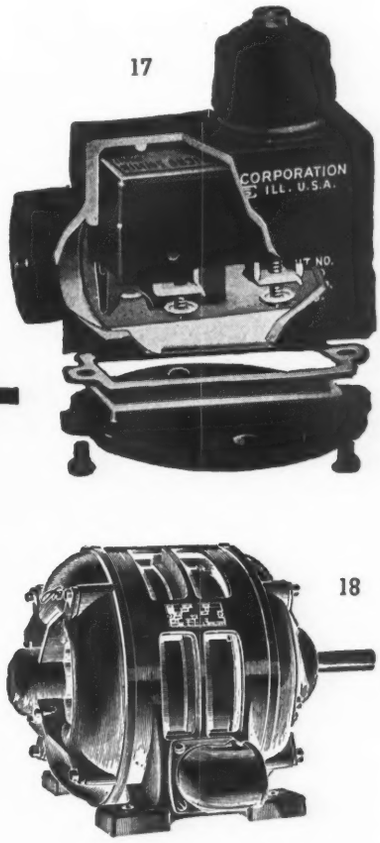

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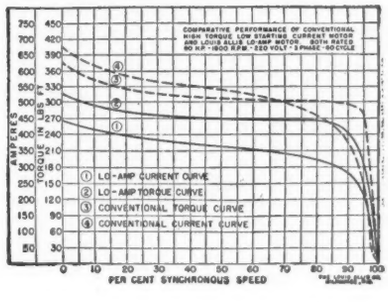
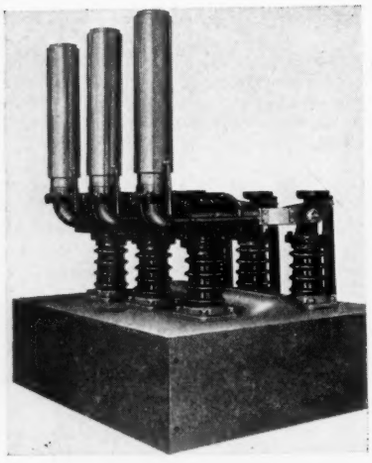

COMPARATIVE PERFORMANCE OF CONVENTIONAL HIGH TORQUE LOW STARTING CURRENT MOTOR AND LOUIS ALLIS LO-AMP MOTOR BOTH RATED 60 H.P. - 1800 R.P.M. - 220 VOLT - 3 PHASE - 60 CYCLE
AMPERES
TORQUE IN LBS. FT.
① LO-AMP CURRENT CURVE
② LO-AMP TORQUE CURVE
③ CONVENTIONAL TORQUE CURVE
④ CONVENTIONAL CURRENT CURVE
PER CENT SYNCHRONOUS SPEED

1 OILLESS CIRCUIT BREAKER—Type AB-15-500 oilless breaker uses prestored energy of compressed air for the functions of breaker operation and arc interruption. Consists essentially of an air-storage tank containing compressed air, a main air-blast valve, three interrupting chambers mounted upon hollow insulator supports, three exhaust mufflers and isolating contacts connected in series with the interrupting chambers, also mounted on insulator supports. Compressed air operating against a piston attached to movable contact causes contacts to separate, thereby providing outlet through which compressed air escapes into the cooling chamber. As contacts open, arc is drawn and immediately enveloped by air blast. *Allis-Chalmers Mfg Co, Milwaukee, Wis.*

2 MOTOR STARTERS—Furnished in sizes "O" and "1", units are designed for stopping, starting, and overload protection of single and polyphase motors up to 7½ hp. Feature of starter is automatic relatching mechanism said to eliminate any resetting operation. Operation is "handle-free"; an excessive overload will open circuit even though handle is intentionally held in "on" position. *Colt's Patent Fire Arms Mfg Co, Hartford, Conn.*

3 MAGNET DRIVE—"E-M Magnetic Drive" uses electromagnetic principles for torque transmission. Unit is rotating device to provide controllable, variable speed and consists of two simple compact rotating parts, a flux linkage ring, and a magnetic flux producer. The ring is driven by the driving motor; the magnet revolves within the ring and drives the load shaft. There is no mechanical torque connection between ring and magnet. Torque transmitted by magnetic drive, and speed of load shaft, is dependent on magnetic flux in air gap. This magnetic flux is varied by adjusting with a rheostat small magnet current control. *Electric Machinery Mfg Co, 1331 Tyler St, N E, Minneapolis, Minn.*



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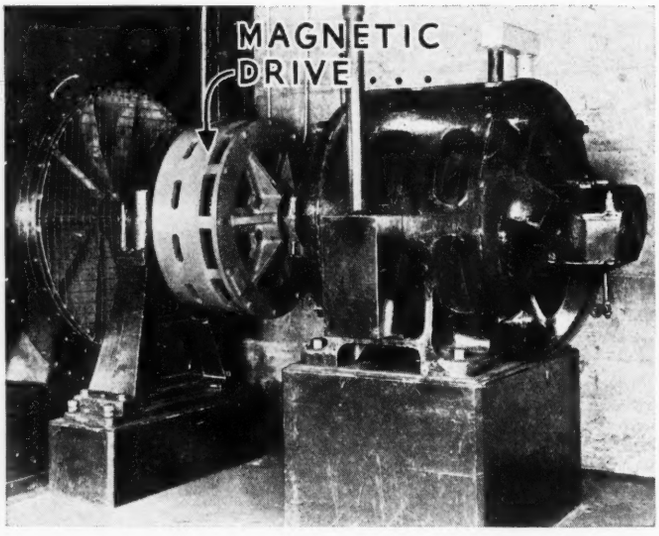

PIPING, FITTINGS AND VALVES

1 SOLENOID VALVE—Sporlan valves for water and refrigerants can be taken apart in field for servicing or repairing. Coils are moisture proof, valves said to be easily opened against rated pressures. *Spoehrer-Lange Co, St. Louis, Mo.*

2 VALVE-SEAT REFACERS—Carlan AAB refacers renew seats on all makes of flat-seat globe, cross and angle valves. Two types available: type F for flat work and type B for bevel work in sets or singly, in sizes from ⅜ to 8 in. All are self-centering and reface valve without chattering. Illustration on right shows 1-in. bevel refacer assembled in valve ready for use. Left picture shows valve refacer mandrel, with centering device, through spider. *Carlan Tool Co, 720 Edgar Rd, Elizabeth, N. J.*

TRAP—Discharger is essentially positive-acting trap designed to handle large quantities of condensate or carryover at relatively high pressures. Discharger, by means of pilot valve, applies steam line pressure to open discharge valve. Displacement weights of different densities move pilot control valve. When pilot has opened, steam is admitted to top of main valve piston, opening discharge valve. Drains are discharged from bottom of body through eduction pipe to outlet. *Cochrane Corp, 17th & Allegheny Aves, Philadelphia, Pa.*

TRAPS—Two new traps supersede small Series 200, formerly made. Features of new traps include more rugged construction, with more metal added at connecting points and around water passages; freer flow of water due to redesigned cross-section of water passages; 1-piece stainless-steel bucket with single casting size for both ½- and ¾-in. pipe connections. Both new traps have inverted-bucket operating principle, free-floating valve mechanisms, self-scrubbing action, heat-treated valve seats. *Armstrong Machine Works, Three Rivers, Mich.*

3 MULTI-STAGE VALVE—Multi-stage throttling valve for continuous blowdown of high-pressure boilers has cone-shaped poppet with scientifically curved grooves forming series of contact lands with converging walls of seat. When valve is cracked during opening, pressure is stepped down by easy stages to reduce wire drawing and prevent erosion. Metering pin extending from end of plug acts also as needle valve. This is centered between walls of venturi seat to control size of orifice without hindering smooth flow. *Ludlow Valve Mfg Co, Troy, N. Y.*

4 STEAM TRAPS—Addition to line of steam traps includes No. 20, designed along line of previous models, with improvements. These include lever mechanism of new design, with no pins or pivots, a drain plug at bottom and capacity to 200 lb. *V D Anderson Co, 1934 W 96th St, Cleveland, Ohio.*

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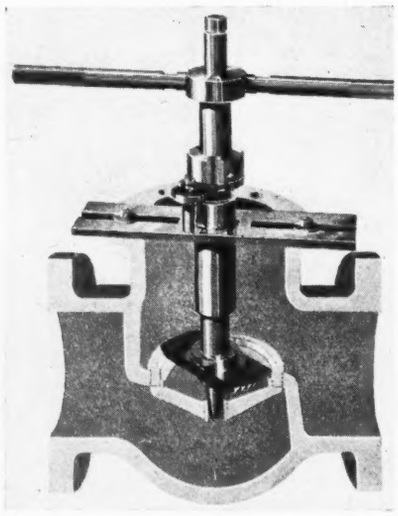

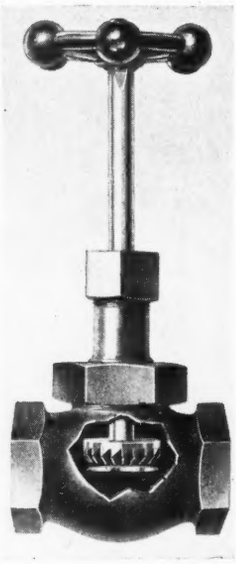

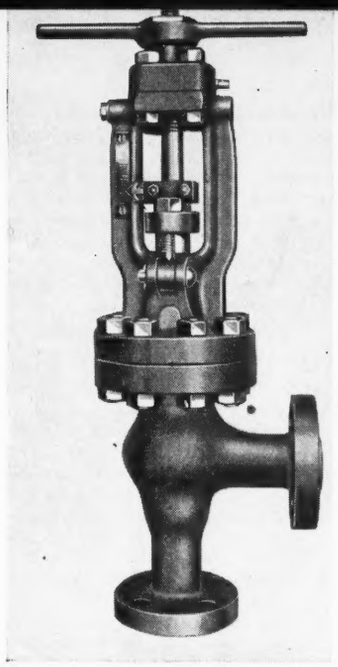

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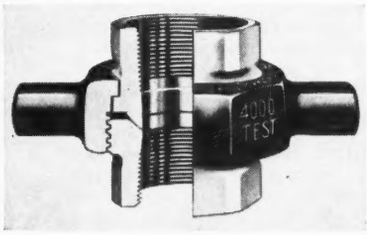

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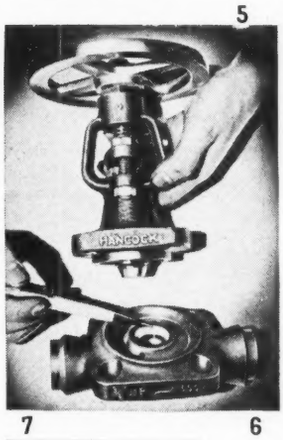

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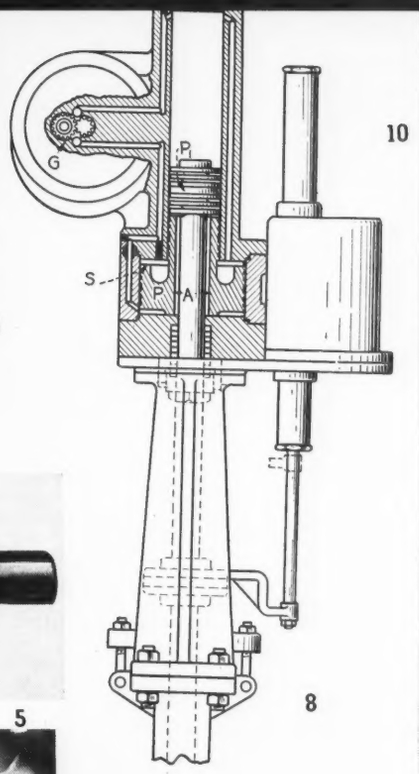

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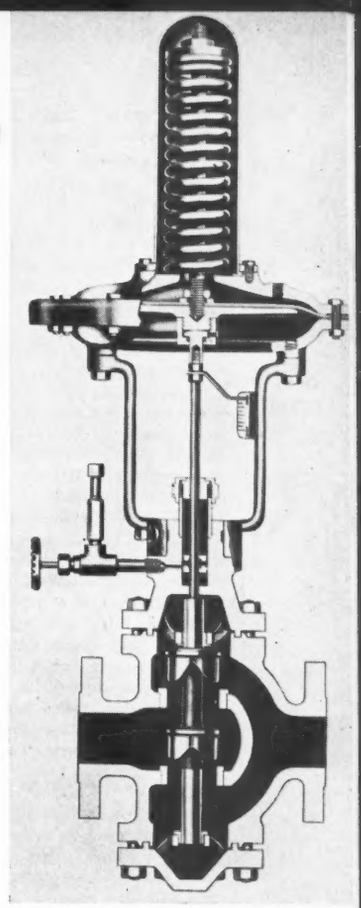

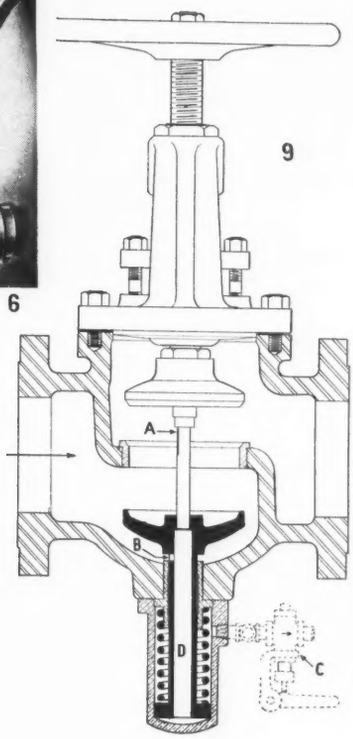

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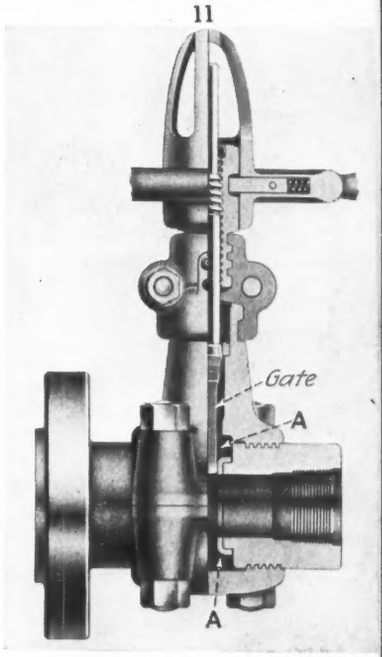

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5 STEEL UNION—"Hi-Speed" union has extra-heavy hub ends and nut; both ends are rust-proofed, spark-proofed and threads are permanently lubricated cadmium. Built for working steam pressure of 700 lb at 800 F, or 3000 lb cold working. *Clayton Mark & Co, Evanston, Ill.*

6 STEEL VALVE—"Duravalve Jr" has Stellite seat welded integral to body. Valve has body and bonnet of carbon-molybdenum steel, giving it a temperature rating of 900 F at 600 lb. *Hancock Valve Div, Manning Maxwell & Moore, Inc, Bridgeport, Conn.*

7 CONNECTORS — "Superseal" connectors use exclusive compression joint, sealed both inside and outside with tubing ends flared to 20-deg angle. This provides long flare with tubing wedged between self-aligning comparison nut and fitting. Connectors can be loosened and tightened any number of times, still retaining full inside diameter of both tubing and fitting. *Superseal Co, 300 4th Ave, New York, N. Y.*

8 HYDRAULIC VALVE OPERATOR—Comprises motor-driven gear pump *G* and tandem pistons *P* and P_1 acting directly on valve stem and eliminating all gear reductions. At start of stroke to open valve, fluid is pumped under large piston *P* and a large thrust is developed to unseat valve. Large piston seats at *S* after traveling far enough to unseat valve. Fluid then passes up annular passage *A* under small piston P_1, which exerts sufficient thrust to complete gate movement at faster rate. On opening stoke, valve motion is stopped by a limit switch opened by motion of valve when it gets near limit of travel. Valve is closed by reversing pump to deliver fluid on top of piston P_1. As valve reaches the end of its stroke a pressure is built up which insures tight seal when pressure switch opens to stop pump motor. *John S Barnes Corp, Rockford, Ill.*

9 OVERSPEED VALVE—Du-al combined stop and emergency valve provides manual control, emergency closure and automatic reopening for steam, air, gas or liquids. Normally, emergency valve is held in full open position by spring shown in cylinder. Emergency valve disk with its extension and clearance piston comprise one moving part. Clearance piston, which has no contact with cylinder, is surrounded by at air, gas, or liquid line pressure. Steam passage is shown from *B* through *D* in illustration. To close emergency valve, pilot valve *C* in line from underside of cylinder, or similar valve at any desired remote control point, is momentarily opened, thus releasing pressure element from cylinder in back of clearance piston. With full pressure remaining in front of piston, there is a net closing load of several hundred pounds, causing instant closure when pilot valve is opened. Main emergency valve closes in direction of flow and becomes unbalanced when seated. To reopen this valve, hand or manual valve is first closed. Recess in guide stem *A* acts as a port, admitting line pressure from port *B* which immediately balances pressure between two seated valve disks and line pressure. Emergency valve then returns to wide open position because of spring acting against piston. *Oscar H Ludeman, 420 Lexington Ave, New York, N. Y.*

10 VALVES—Stabilflo valves designed for accurate response to demands of control instrument. Accuracy said to be provided by floating-power motor, which is suspended, eliminating need for anti-friction bearings. Plungers are fitted with top and bottom guides of stainless steel. *Foxboro Co, Foxboro, Mass.*

11 GATE VALVE—"Flex-Seat" gate-mud valves are designed to handle any grit-laden fluid. Valve body split horizontally with threaded-in connections. Gate moves in and seats on a resilient insert, *A*, that resists effect of grit-laden fluid and is said to last about five times as long as metal insert. Within certain limits, foreign material trapped between gate and seat is imbedded into seat when gate closes and tight seal is obtained. *Cameron Iron Works, Houston, Texas.*

1 SOLENOID VALVE—Three-way pilot-type valve, with momentarily energized single operating coil is for air at pressure to 75 lb. Solenoid and simple operating mechanism are arranged so that energization of solenoid through 3-wire control circuit acts to close the open port and at same time open closed port, thus applying pressure to diaphragm or cylinder. *Automatic Switch Co, 41 East 11th St, New York, N. Y.*

2 GLOBE AND ANGLE VALVES—Made in sizes from ¼ to 2 in. for 200-lb steam and 400-lb cold water, oil or gas, non-shock. Angularity and length of disk and seat ring have been proportioned to minimize wear at small openings, and to permit tight closure. *Kennedy Valve Mfg Co, Elmira, N. Y.*

3 WEIGHT-OPERATED TRAP—In Model C trap, water entering raises float to its highest point of travel, where it releases weight latch, allowing counterweight to fall. Counterweight is attached to crank which lifts discharge valve wide open immediately. This is held wide open by link latch until discharging water carries float to lowest point of travel. At this point weight latch engages counterweight, which has been lifted by falling float, and linklatch disengages. *W H Nicholson & Co, Wilkes-Barre, Pa.*

4 VALVES—"Hydra" valves may be used on water, steam and oil lines, at pressures up to 4000 lb psi. ⅛-in. turn of operating handle opens or closes valve. During this operation four stainless-steel balls that close valve are automatically engaged into port holes due to pressure on line. *Albright Equipment Co, 939 Crafts Bldg, Pittsburgh, Pa.*

5 VALVE OPERATOR—C-H valve-operating unit provides controlled thrust action directly on valve stem, but has thrust-limit switch which seats valve without jamming or damage. Consists essentially of thrust springs, which compensate for expansion and contraction of valve stem; high-torque reversible motor, simple jaw clutch for coupling operator to yoke nut, and gear reduction. *Cutler-Hammer, Inc, St Paul Ave, Milwaukee, Wis.*

6 REGULATING VALVE—Type D valve can be adapted for steam, cold-water, hot-water, air, various gases, oil, etc, by changing seat disk. Stainless-steel seat nipples are used, having various size orifices, with stainless steel used where valves are for steam, etc, and composition for water, etc. By using restricted seat orifices of different sizes for various ranges of reduced pressure, valve is forced open wider, cleaning itself and reducing wire drawing. *Cash Universal Regulator Co, Marshalltown, Iowa.*

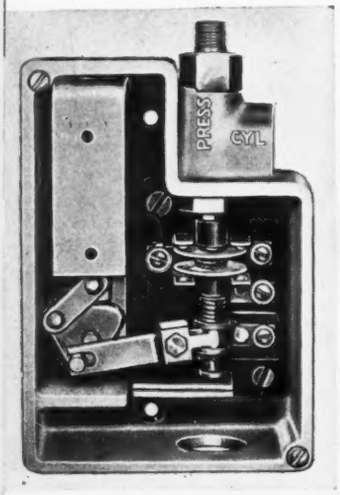
7 SWING JOINT—High-temperature joint is designed for operation at working pressures up to 500 lb, 700 F. All pressure or load is transmitted through double rows of hardened-steel balls in hardened races. Pressure or load required to force members apart would have to equal shearing strength of metal. Rated capacity less than shearing strength, so margin of safety is included. *Chiksan Tool Co, Brea, Calif.*

8 STRAINER—"Easyclean" strainer made for steam, air, gas, oil or water. Features claimed by maker include easy connection to pipeline as union, and facility in cleaning. *Wright-Austin Co, Detroit, Mich.*

9 GIANT STEAM TRAP—Armstrong trap has 6-in pipe connections and continuous flow capacity for 300,000 lb per hr of water at 50-lb pressure. Consists of large inverted bucket-type pilot trap and piston-operated main valve, main valve assembly being installed as elbow in drain line. Pilot trap is connected to drain line at point above main valve assembly and main valve is sealed in this manner. Unit is non-airbinding. *Armstrong Machine Works, Three Rivers, Mich.*

10 STEAM VALVE—Ostlind valve is designed to eliminate causes of leaky valves rather than resist them, maker says. Uses spinning-disk principle to maintain metal-to-metal contacts between seat and disk. This disk is mounted on spindle against stainless-steel thrust bearing, aligning disk with seat when closing. Bearing will stand 950 deg F, maintaining hardness of 60 Rockwell C. Just before closing, these vanes will be hit by flow directed to them by reversing chamber, causing disk to spin at closing moment. This spinning motion causes all scale and foreign particles to be thrown off, preventing them from being caught in line of seating. Disk hits seat spinning at high speed, polishing line of closure and creating metal-to-metal contact. *Ostlind Valve Co, Portland, Oregon.*

11 AUTOMATIC VALVE—Air eliminator consists of conventional-type diaphragm valve to which has been added special dome-shaped inlet chamber. Bellows-type thermal expansion unit is housed in dome of inlet chamber. This raises and lowers a needle valve that seats against an orifice mounted in top of dome. Operation is automatic and is based on fact that air in steam system has effect



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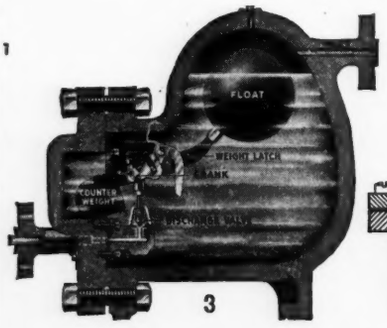

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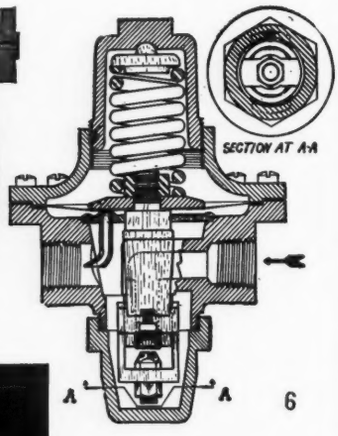

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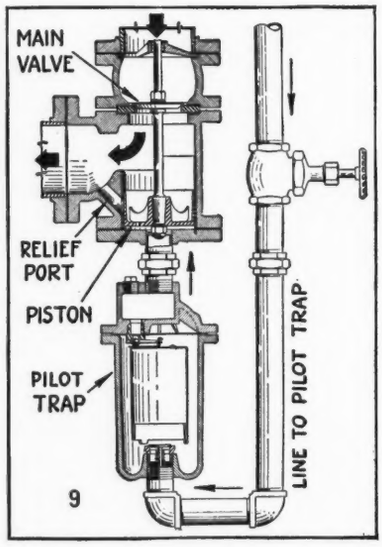

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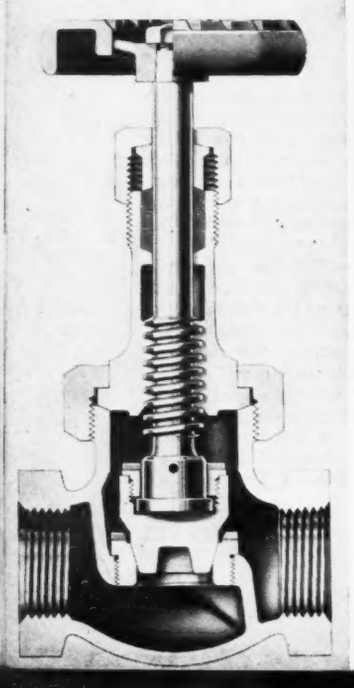

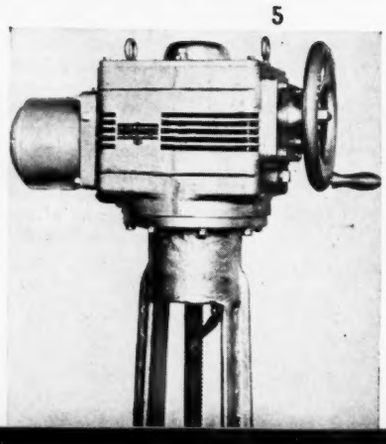

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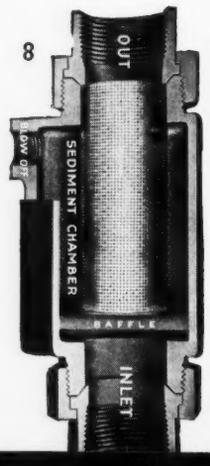

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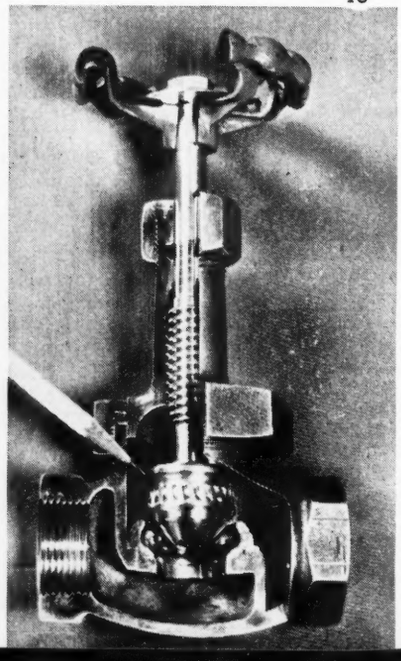


of lowering steam pressure and temperature. *Armstrong Machine Works, 812 Maple St, Three Rivers, Wis.*

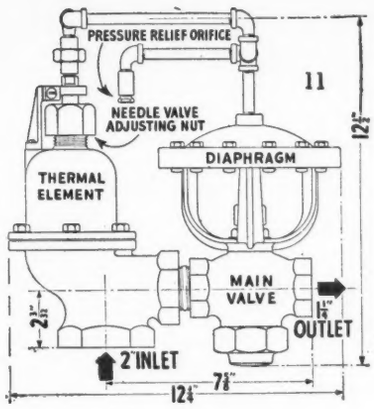
12 EXPANSION JOINT—Adsco packless expansion joint, U-ring type, is for high- and low-pressure and temperature services, steam and hot-water lines. Expansion element (1) in illustration, is series of welded U-rings of corrosion-resistant steel which is welded to steel body (2) and guide (4) on movable sleeve (3) to form permanent seal between stationary body and movable sleeve. Element is compressed axially or cold-sprung one-half of total traverse for installation in cold line. As line expands with application of heat, compression in element is relieved and it passes through the neutral position into the remaining half of traverse. *American District Steam Co, 70 Bryant St, N Tonawanda, N. Y.*

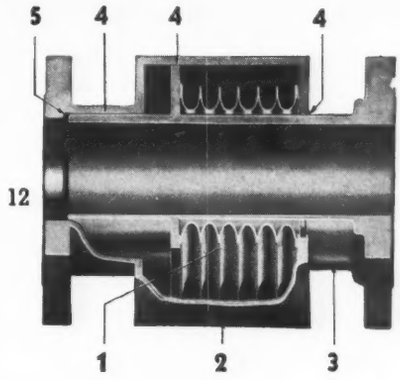
13 RELIEF VALVE—Safety head relief valve has setting slightly above working pressure of vessel on which it is installed. After unit is installed on pressure system, slight lift on button *A* opens relief valve, which is then held open by diaphragm *B* until rupture disk *C* is burst by over-pressure. This removes pressure from actuating diaphragm *B* and valve becomes ordinary spring-pop valve, closing when emergency is past. *Black, Sivalls & Bryson, Inc, Kansas City, Mo.*

14 MOTOR VALVE—"Hydramotor" valve will handle air, gas, water, brine, saturated steam, etc, and is hydraulically operated. Operator is totally enclosed, sealed in oil, and drip-proof. Valve itself is normally closed; applying current opens it. *General Controls Co, Glendale, Calif.*

STEAM TRAP—Indirect type consists of small standard Sarco inverted-bucket trap coupled to diaphragm in condensate-return line. Large valve is normally closed but is opened by trap when condensate opens trap valve, thus putting line pressure under diaphragm of main discharge valve. *Sarco Co, 183 Madison Ave, New York, N. Y.*

PIPE SELECTORS—Slide-rule selector gives conservative answers to problems dealing with selection of pipe sizes for steam and water services. Uses pressure-drop method of determining pipe size instead of velocity. Complete instructions are included. *J O Ross Engrg Co, 350 Madison Ave, New York, N. Y.*





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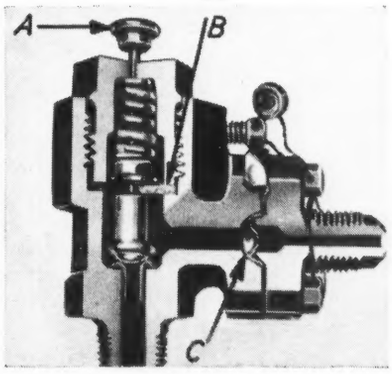

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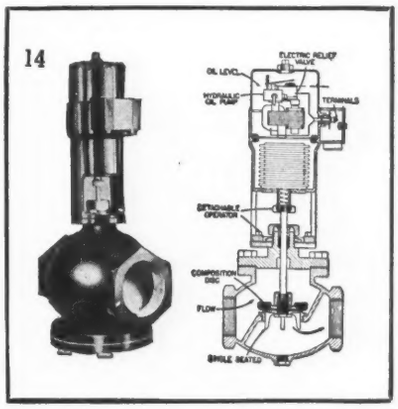


PLUG COCK—Lubricated-type plug cock is for test pressures up to 4000 lb. Has rated working pressure for water, oil and gas of 2000 lb. Stick lubricant is inserted under lubricant screw, which can be turned down. *Merco Nordstrom Valve Co, 400 Lexington Ave, Pittsburgh, Pa.*

STEEL VALVES—New line consists of gate, globe, angle and check valves. Gate valves are cast steel, globe and angle valves are forged steel in two types; and check valves in two types, horizontal pattern being of forged steel. *Crane Co, Chicago, Ill.*

FLANGED VALVES—Valve is similar to type D solenoid valve, except that this model operates on 250 lb pressure instead of 150, has newly designed solenoid with glass insulation, and has modernistic coil shield, said to dissipate heat. *Hoppe Engrg Co, Indianapolis, Ind.*

REDUCING VALVE—Pilot-operated pressure-reducing valve is smaller and more compact than ordinary pilot-operated valve, says maker. Type 92 is equipped with removable pilot strainer separate from valve body. *Fisher Governor Co, Marshalltown, Iowa.*

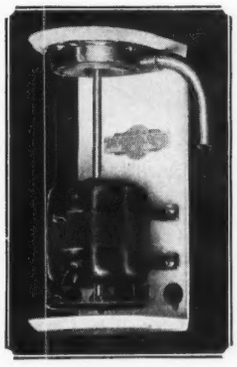
PUMPS

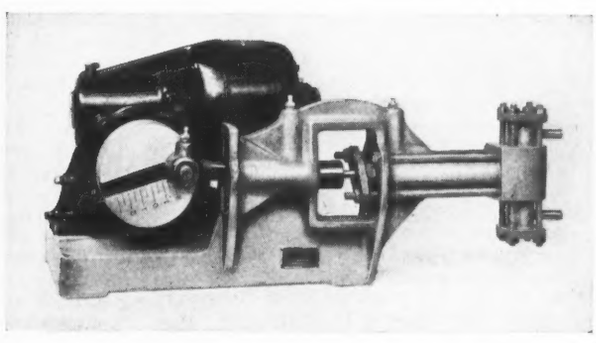
VERTICAL SHAFT PUMP—Type "SW" vertical-shaft pump has motor, coupling, thrust bearing and housing supported by reinforced plate which serves as structural member. Other features include inverted intake in place of side or bottom opening, liberal and simple slippage seal adjustment and split-yoke bearing supports replaceable without dismantling. Either open or shrouded impellers available, of either multi-vane or 2-vane trash type. *American Manganese Steel Div, American Brake Shoe & Foundry Co, Chicago Heights, Ill.*

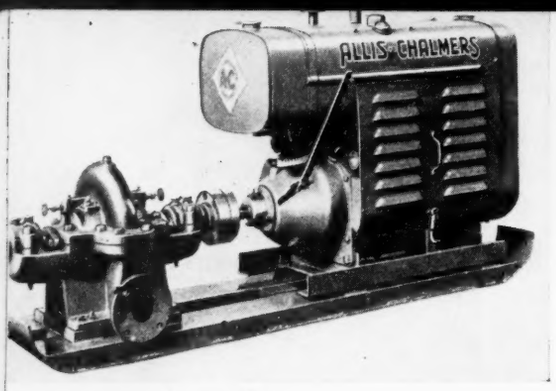
AUTOMATIC ALTERNATOR—Barclay automatic alternator for duplex pumping equipment provides simple means of alternating sequence of pump motor operation, wherever duplex pumping equipment is installed. Further means of automatic control is provided by this device, since it will automatically cut in an idle pump under flood conditions, or in event one pump is out of order, will cut other in for operation. Outfit consists of fully housed controller unit with slotted operating lever, which is constructed to take all sizes of float rods and cables. Device is readily applicable to existing installations as well as to new equipment. *Barclay Control Co, 5152 Division St, Chicago, Ill.*

ACID-RESISTING PUMP—Stainless-steel pump (below) is mounted on vitreous enameled stand, and is available in three sizes from 140 to 360 gph. Features include new type fan which pulls air through motor, self-aligning bearings and tube outlet plated with block tin inside and out. *Air-O-Line Co, Dallas, Texas.*

HYPOCHLORITE PUMP—Designed specially for small water supplies, pumps (below) have sufficient capacity for chlorinating water from 100 to 100,000 gpd. Supplied in corrosion-resistant metals to withstand action of hypochlorite. Column valve is made to discharge







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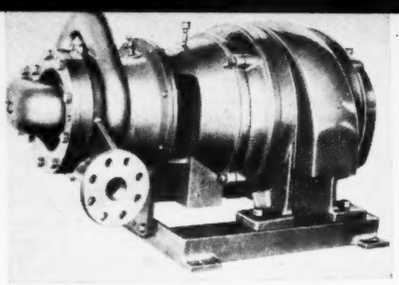

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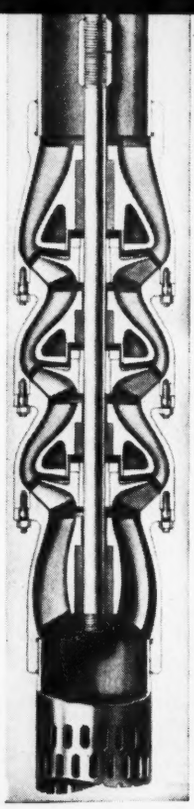

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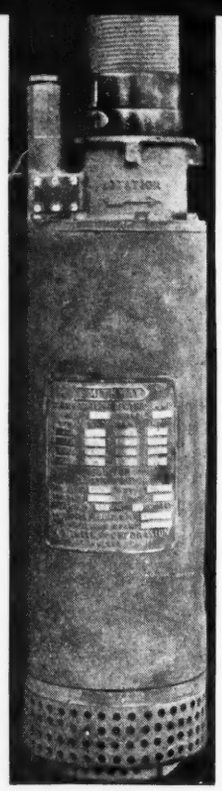

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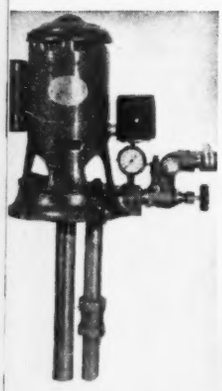

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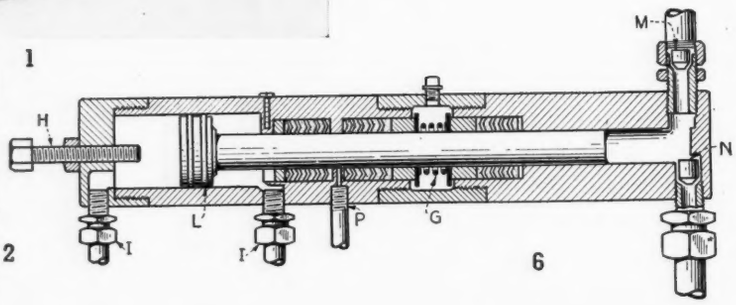

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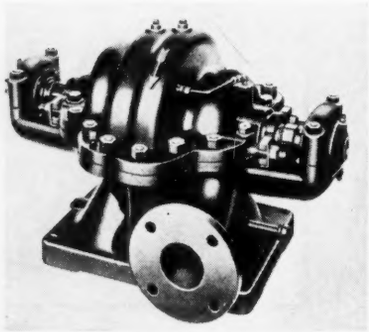

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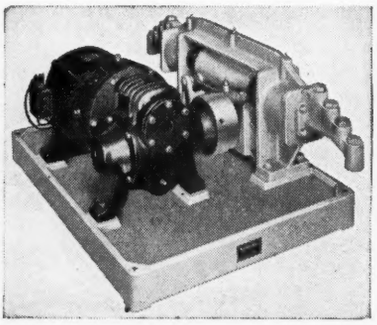

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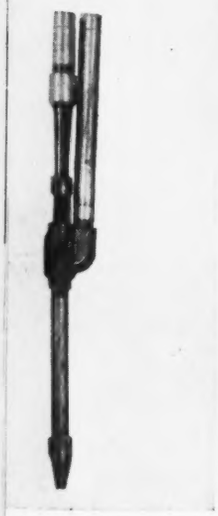

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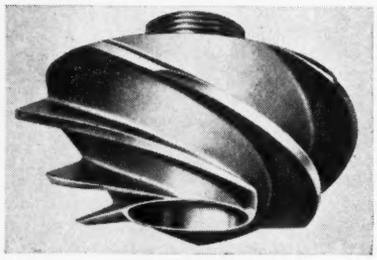


air and small particles of dirt to prevent air binding or clogging. *Milton Roy, 3160 Kensington Ave, Philadelphia, Pa.*

1 CENTRIFUGAL PUMP—Providing independently-powered pumps for drainage, coal-washing, etc, units are used mainly for standby when other sources of power fail. Power units in 5 sizes available from 18 to 110 hp, operating on gasoline, kerosene, distillate, natural gas or butane. Pumps are horizontal-shaft, single-stage, single- or double-suction, designed to handle liquids at normal temperatures. Available in combinations up to 5000 gpm, and 100 ft head. *Tractor Div, Allis-Chalmers Mfg Co, Milwaukee, Wis.*

2 EJECTOR PUMP—Deepwell, 2-pipe ejector pumping system consists of vertical volute pump close-coupled to a 3500-rpm, 60-cycle, single-phase motor, placed above ground and connected by two pipes to ejector, near or below water-surface level in well. Well is closed by fitting into which ejector pipe from discharge pipe connects. Well packer below ejector seals suction pipe into well so that water passing down inside well casing can pass through ejector only. Pumps can be used in wells 2-in. minimum inside diameter. Pump capacities range up to 60 gpm and lifts up to 110-ft. *A D Cook, Inc, Lawrenceburg, Ind.*

3 TWO-STAGE PUMPS—Split-case, 2-stage pumps have capacities up to 550 gpm. One-piece impellers are of cast iron, bronze or other alloy. They are mounted "back-to-back" on shaft for proper hydraulic balance. Casing is horizontally divided so that upper casing may be lifted to expose entire rotating element. *Fairbanks, Morse & Co, 600 S Michigan Ave, Chicago, Ill.*

4 MIDGET PUMP—Model E is adaptable to all installations requiring pumping of thin liquids, where weight and space must be kept at a minimum. Has maximum volume of 8 gpm, with highest pressure of 20–25 lb psi. *Eastern Engineering Co, 45 Fox St, New Haven, Conn.*

5 UNIT PUMPS—"SSUnit" pumps, in which motor and pump housing are bolted together for compactness, have had additions made to line. Stuffing box on pump is only part subject to suction pressure, according to pump maker. *Allis-Chalmers Mfg Co, Milwaukee, Wis.*

6 CHEMICAL PUMPS — Nelson "synchronized-drive" pumps have no auxiliary motors, levers, cams, or driving meters. Pressure drop across either cylinder of main reciprocating pump supplies chemical pump with only motivating force it needs. Pressure take-offs from each end of either power or fluid cylinder of main pump connects to comparable cylinder in chemical pump through *I*. Any change in pumping rate of main pump simultaneously changes pumping rate of chemical pump. Stroke adjustment by means of screw *H* permits varying chemical volume at will. Spring-tension packing nuts at *G* eliminate usual packing nuts, automatically taking up wear in packing. Hole *P* gives visual indication when new packing is necessary, and poppett-type valves *M* and *N* open and shut on pump pressure and suction alone. *D W Haering & Co, Inc, 2306 S Winchester Ave, Chicago, Ill.*

7 CHEMICAL PUMP—Opposed-type duplex chemical pump has capacity of 4 gph against pressure of 3000 lb. Duplex pumps of this type can be furnished to pump against pressures up to 20,000 lb and are recommended for handling alkalis, oil solutions, sulphuric-acid concentrations, chlorine solutions, and hypochloric and phosphoric acids. *Milton Roy Pumps, Philadelphia, Pa.*

8 PUMP IMPELLERS—Impellers are constructed with aluminum bronze under new process. Alloy is drawn by vacuum into steel die from point below surface of molten metal. This molten metal rises into die in a smooth continuous flow with effect of nozzling or pouring; steady flow of metal is maintained until die is filled. *Worthington Pump & Machinery Corp, Harrison, N. J.*

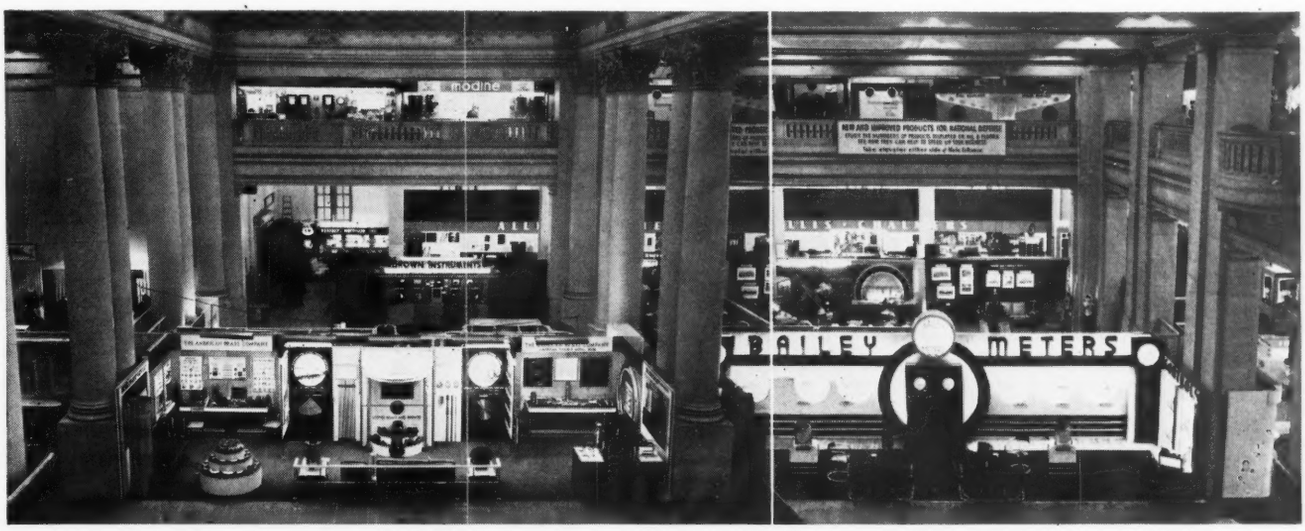
9 VERTICAL TURBINE PUMPS—Redesigned line of 6-in. medium capacity vertical turbine pumps feature newly-designed impellers and seats. Available for desired capacity of 100-gpm against 110-ft lift in a well, and 50-lb pressure above. New model requires only 7½-hp motor as against 10-hp for former model. Cross-section shown illustrates impellers and seats. *Pomona Pump Co, Pomona, Calif.*

10 SUBMERSIBLE PUMP—Unit is equipped for submergence with direct-connected strainer. Motor in pump is water-jacketed, and

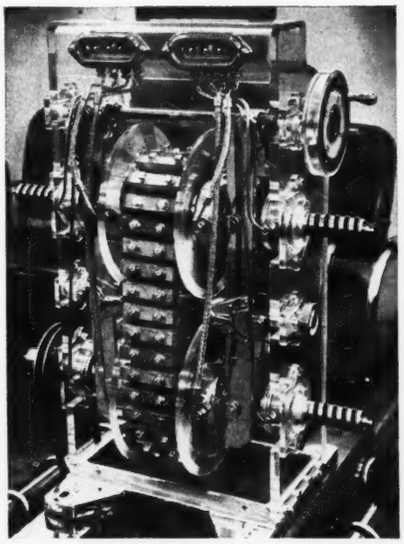
(Continued on page 100)

Highlights of the Power Show

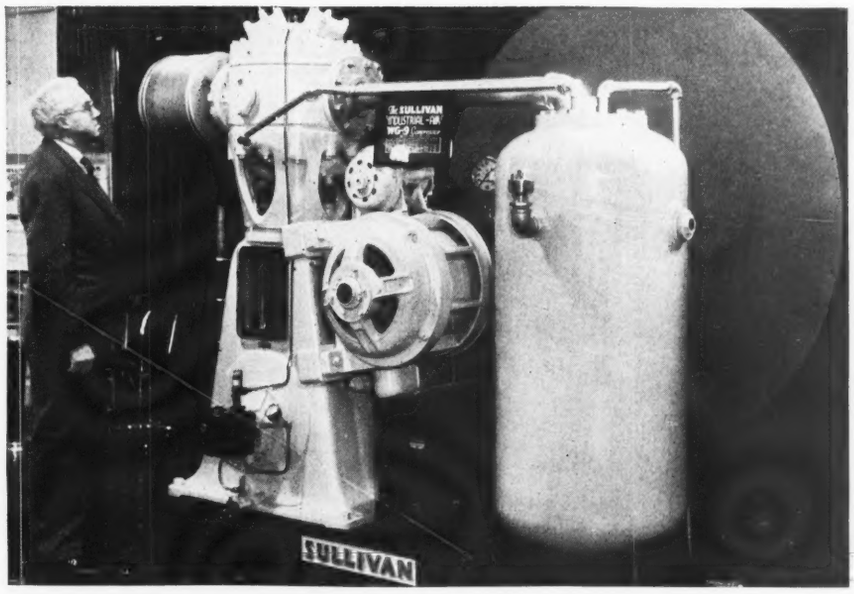
Noteworthy addition to the long line of successful Power Shows was the 14th Annual Exposition of Power & Mechanical Engineering, held in Grand Central Palace, New York, December 2-7. Although some displays were not up to the showmanship standards set in other years, due to press of business in filling defense orders, there were fifteen more exhibits this year than in 1938; particularly well represented were mechanical-transmission equipment, valves and piping, meters, combustion and other controls and many more power-plant auxiliaries



Practically every imaginable kind of power-plant auxiliary was in evidence, including meters, combustion controls and regulating equipment, valves and fittings, valve operators, pumps, insulation, refractories, feedwater treatment, flue-gas cleaners, and others



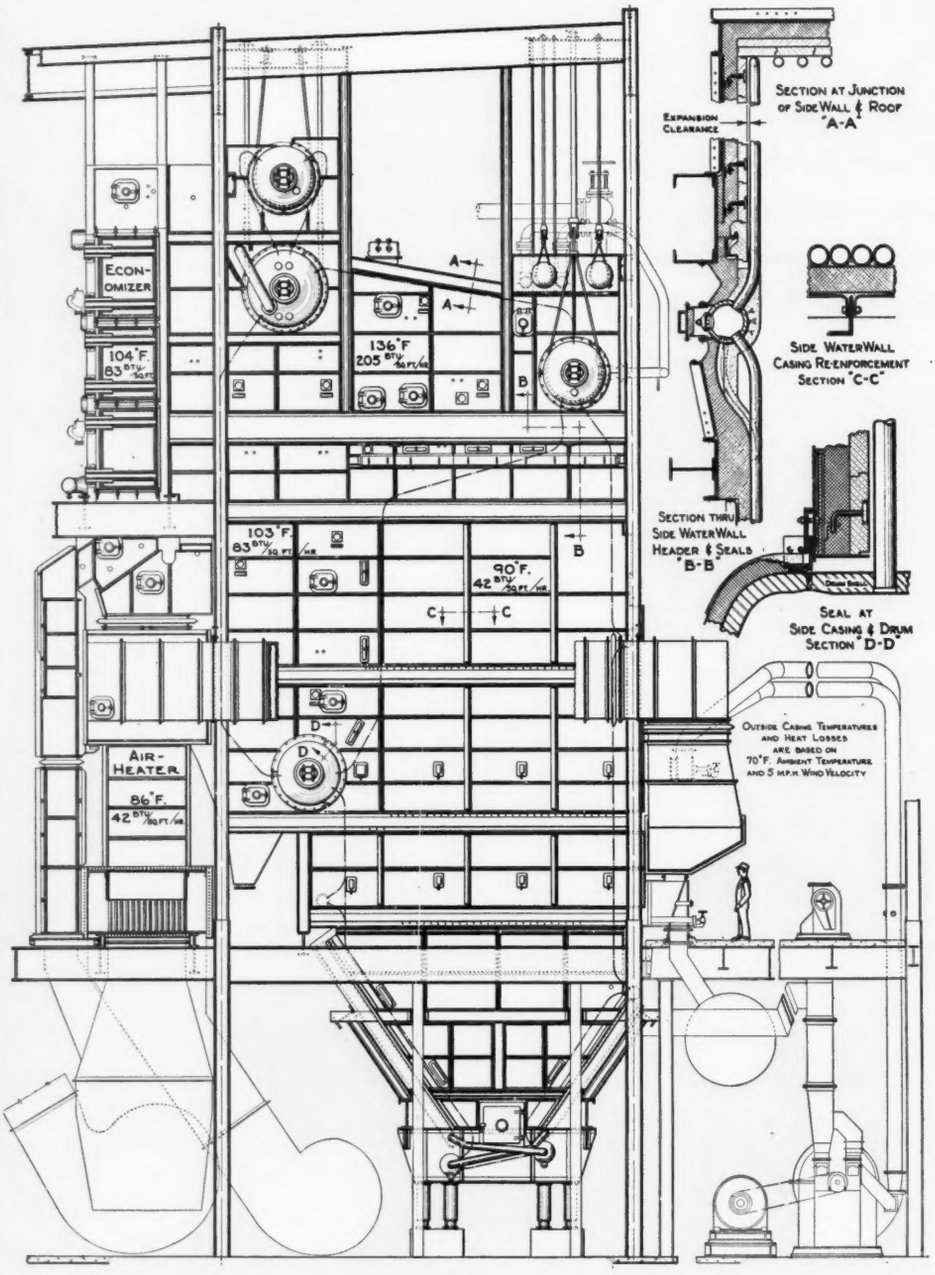
All types of mechanical-power-transmission equipment were shown, but this unit held the center of the stage. Its casing is made of transparent plastic so that the speed-changing mechanism and the changes in speed could be observed



Among the larger pieces of power equipment in operation at the Show was this motor-driven, vertical-cylinder, single-stage, double-acting, 183-cfm, 100-lb, 600-rpm air compressor. The driving motor is mounted directly on the compressor and is connected to the flywheel by a multiple V-belt

(Continued on page 90)

Dollars and Cents Logic dictates the



Advantages of the Riley Steel-clad Insulated Setting. . .

1. Complete and permanent air tightness
2. Low radiation loss
3. Permanency—low maintenance
4. Strength to withstand high internal pressures
5. Elimination of internal setting leakage
6. Proper expansion provision
7. Pleasing in appearance

Riley Steel-clad Insulated Setting recently installed in connection with a 450,000 lbs./hr. Riley pulverized coal and blast furnace gas fired boiler unit for one of the large steel companies . . . the largest boiler unit in the steel industry.

TRADE MARK Rx REGISTERED

RILEY

STOKER CORPORATION, WORCESTER, MASS.

Boston New York Philadelphia Pittsburgh Buffalo Cleveland Detroit Tacoma Baltimore Milwaukee Denver St. Louis Cincinnati Houston Chicago St. Paul Kansas City Los Angeles Atlanta Memphis New Orleans

It will pay you to visit modern Riley Installations

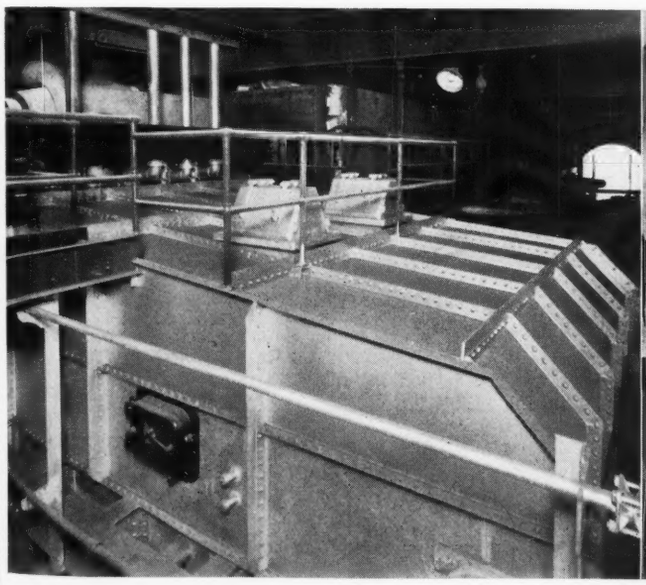
use of the RILEY Flanged air tight steel boiler casing

A steel casing for boiler settings cannot be economically justified from the appearance standpoint alone. Its use must bring about dollar savings through lower operation costs.

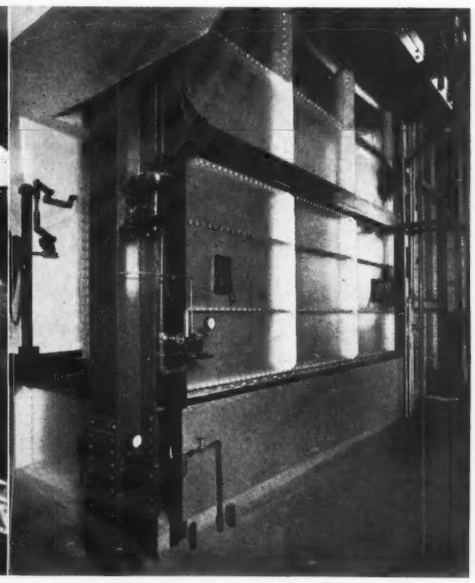
There is no question but that the flanged steel casing used with Riley Units is expensive to manufacture and erect. However, this additional expense over the cost of the common batten strip type of casing is well justified by the operating savings resulting from this superior construction.

One of the main requirements of the steel casing is to assure complete and permanent air tightness. A tight casing prevents air infiltration which causes lower efficiency and higher fan power. A tight casing by preventing these losses is fully justified. Air tightness is assured in the Riley casing through the use of flanged joints and metal to metal seals. Experience indicates that flanged joints are absolutely necessary to assure *permanent* air tightness. The degree of tightness of the Riley casing is indicated by the fact that CO_2 decreases less than ½ of 1% between furnace and induced draft fan.

But air tightness is not the only advantage of the Riley Steel-clad Insulated Setting. The Riley Setting also assures low radiation loss, practically eliminates setting maintenance, assures against setting damage, and presents an excellent appearance. The quality of design and workmanship of the Riley Steel-clad Insulated Setting reflects the engineering care with which the entire Riley Unit is designed and constructed. A design which has exceeded the generally accepted standards for modern steam generating units.



Casing construction over boiler roof. The cost of a flanged casing rather than batten strips is greater but positive tightness is assured.



View of side of unit. CO_2 reduction between furnace and air heater outlet with Riley units is less than ½ of 1%. Evidence of the worth of the Riley flanged casing construction.

You will be interested in a paper delivered at the annual meeting of the A.S.M.E. in New York, entitled "Steel Encased Boilers for Modern Steam Generating Units." We will be pleased to send a copy at your request.

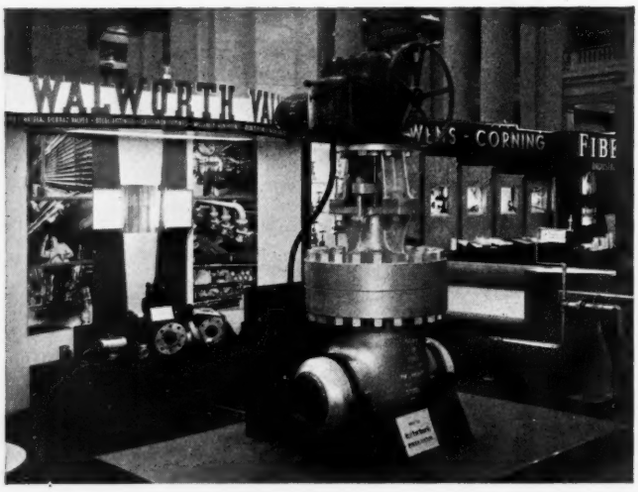
A survey of your power plant by a consulting engineer will possibly show ways of making surprisingly large savings in power costs

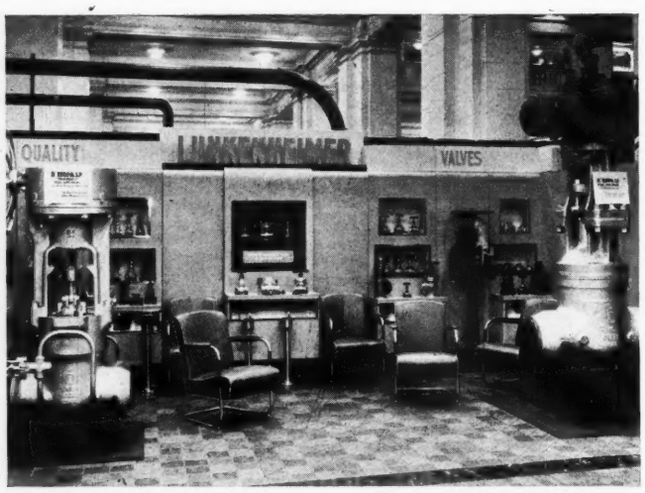
COMPLETE STEAM GENERATING UNITS

BOILERS • PULVERIZERS • BURNERS • STOKERS • SUPERHEATERS • AIR HEATERS
ECONOMIZERS • WATER-COOLED FURNACES • STEEL-CLAD INSULATED SETTINGS • FLUE GAS SCRUBBERS

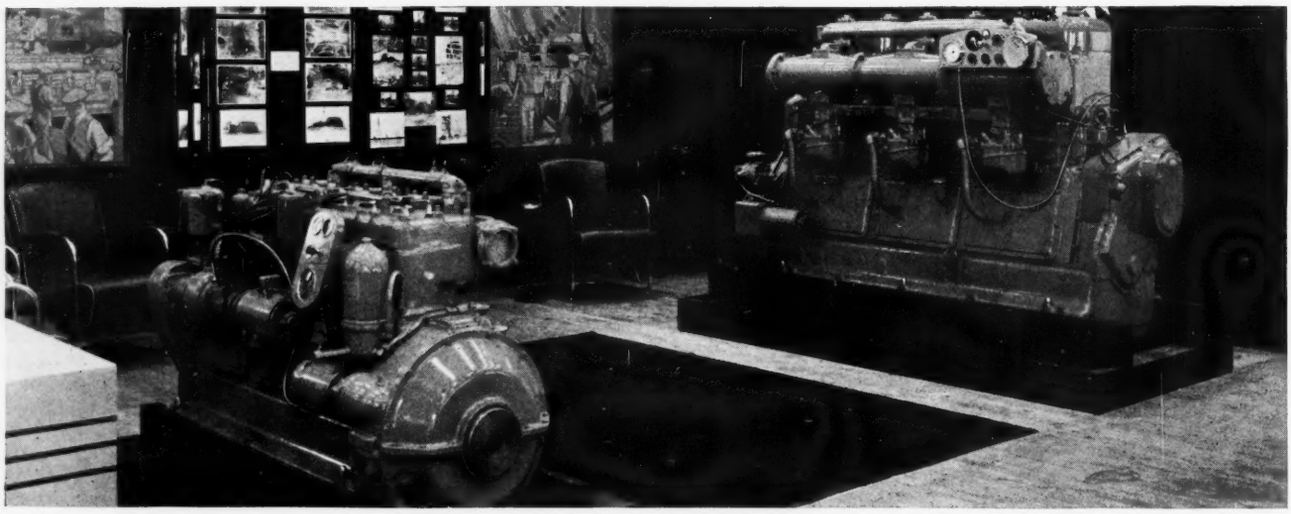
before purchasing Boiler or Fuel Burning Equipment

(Continued from page 87)

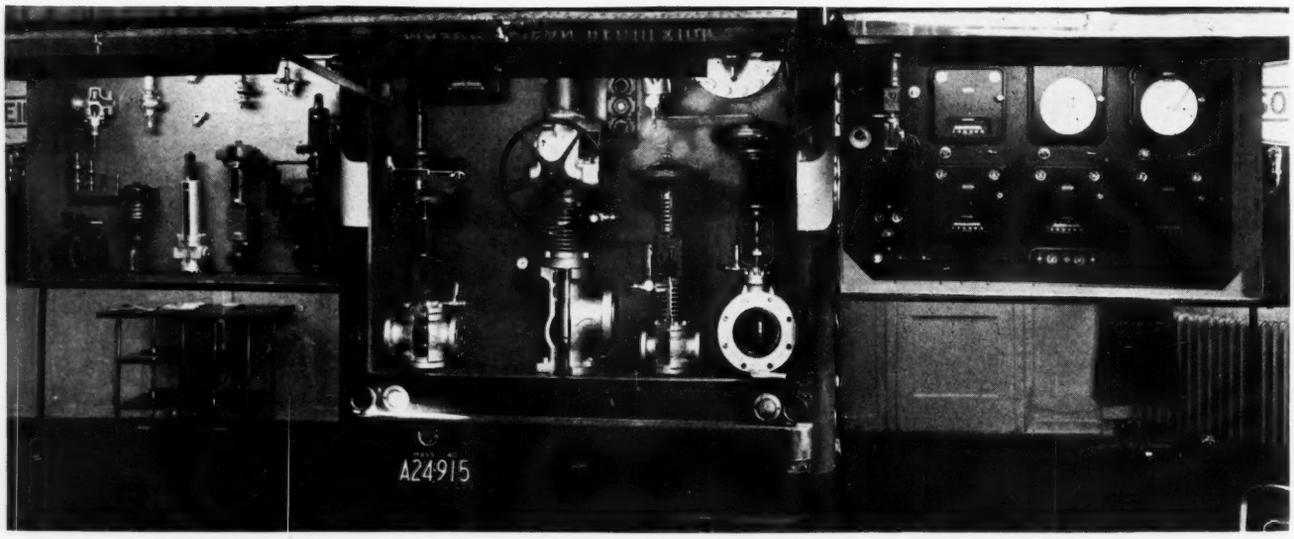




Typical of the many valve exhibits were these two high-pressure, high-temperature displays. These and others included 8-in. and 3-in. valves for 2500 lb and 950 F; 14-, 12-, 10-, 8-in. and smaller-size valves for 1500 lb and 950 F



The largest prime movers shown were a 425-hp., 6-cyl, 1200-rmp (right) and a 185-hp, 6-cyl, 1800-rpm (left) gasoline engine for stationary applications in electric-power-generating, pumping and other plants



This exhibit was pretested in 20,000 miles of service—the truck is equipped with an air compressor and other apparatus to demonstrate metering of flow, pressure regulation, and operation of free-flow, butterfly and other types of diaphragm-motor-operated valves

In the eight pages that follow will be found digests of power papers and pertinent discussions presented at the Annual Meeting of the American Society of Mechanical Engineers

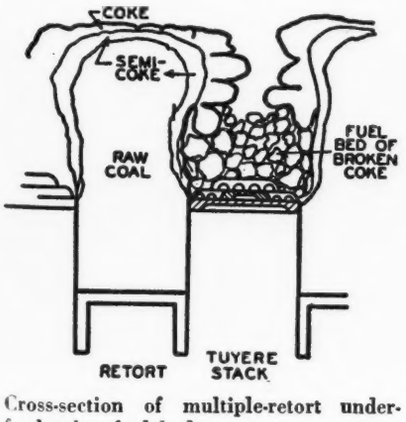
Fresh Facts on Fuel and Ash

▶ EXTENDED USE of pulverized coal brings a need for information on ash in addition to the properties recognized by the ASTM standard, according to E G Bailey, Babcock & Wilcox Co. Specifically, realization of the importance of iron in ash and slag as affecting the fusing temperature and growing knowledge of the practical effect of the surrounding atmosphere (whether reducing or atmospheric) point to the need for data on the fusing-temperature range in an oxidizing atmosphere and on the percentage of iron in the ash.

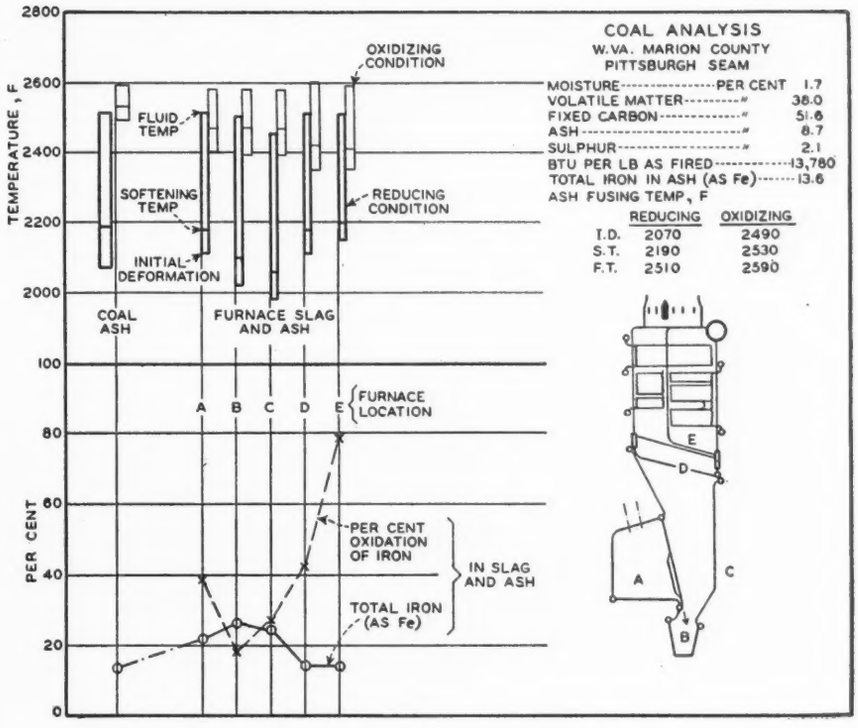
Slag Characteristics

Data on characteristics of slag from actual boiler furnaces shows that furnace slag runs considerably higher in iron content than the original ash, largely due to the fact that heavier pyrites fall into the slag bed and to the fact that ash particles higher in iron content are likely to be more sticky, adhering more readily to surfaces. Ash collected in the tube bank has about the same iron content as the original coal. Farther up the boiler ash is more highly oxidized. Fusing-temperature ranges of slag and ash samples, run in a reducing and in an oxidizing atmosphere, reveal much higher temperatures on the latter basis, which more nearly approximates furnace and gas-pass conditions.

Mr Bailey concluded that the time has arrived for reconsideration and further investigation, and perhaps new standards, with respect to the fusing temperature of ash and slag. The present ASTM standard seems to fit stoker and fuel-bed combustion but evaluation of coal for pulverized firing on this basis should be carefully checked with individual furnace type and rate of operation before being sure of its true value.



Cross-section of multiple-retort underfeed-stoker fuel bed



Slag characteristics in a 2-stage slag-tap furnace

Basing his conclusions on recent research in the structure of stoker fuel beds, Martin A Mayers, Carnegie Institute of Technology, described in some detail the flow of materials in underfeed fuel beds, including solid materials (fuel and ashy refuse), gases (air and products of combustion), and heat, especially that portion of it which recirculates within the bed and leads to preparation and ignition of the coal.

Study of these flow processes makes it possible to outline features desired in a stoker designed for much higher duty than any now in existence. Such a stoker must have narrower retorts than in existing stokers, making possible preparation and coking of coal at a much higher rate. Reducing retort width to 25% of that in conventional stokers would speed coking to 2.3 times the present rate. This would permit maintaining deeper fuel beds over tuyeres of the same width as now used, thus raising ratio of active surface to the total area of the stoker and permitting the average burning rate to approach more closely the burning rate referred to the air-admission surface.

Separation of functions of distribution, coking and delivery, now combined in retort flow, seems essential so that the coke supplied to the tuyeres shall be as uniform in size as possible. Likewise there must be sufficient agitation to eliminate possibility that coke walls may expand and constrict the burning lane. Such a stoker should have a pulsating air blast; the bed would be fluid enough to flow over any incipient blowholes and would allow ash liberated by combustion to sink through it to be discharged at the bottom of the

bed in the cool zone. Varying the time the flutter valve controlling the pulsations remained open would provide stoker control, in place of the usual variation in forced-draft-fan pressure.

Since it is desirable, by use of a deep fuel bed, to require air injected beneath the stoker to take up as large a weight of the combustion gases as it will carry and because some dust will be carried out of the bed, it will be necessary to supply a large proportion of combustion air over the fire using high pressure to insure good mixing. This secondary air may be preheated to as high a temperature as may be desirable thus making possible use of this very flexible method of heat recovery in stoker-fired installations.

Boiler-Room Control

To bring out the factors of boiler-room-operation control, B S Murphy, chief engineer of Hudson Ave Station, outlined the methods used at that plant. The first step in control is planning: this involves preparation of a yearly boiler schedule which will provide steaming capacity to meet all expected daily peaks and yet permit removing

B S Murphy, chief engineer of Hudson Ave Station, Brooklyn, N. Y., says the first step in boiler control is planning

boilers from service at frequent intervals for inspection and maintenance. The yearly schedule helps in preparation of daily "turbine-generator and boiler schedules" which give the boiler operators information necessary to bring up boiler loadings or bring them down to suit load.

The second phase of boiler control, carrying out the plan, includes careful coal measurements, regular testing of coals for burning characteristics and economy, provision of adequate control equipment and facilities, and training and supervision of personnel.

Checking Operation

The final step in boiler-room control is checking. Each day's boiler-meter chart is studied for deviations from scheduled loading, spread between steam and air pens, quantity of steam generated. Metering turbine main and heater condensate with corrections for estimated blowdown and steam sent out of the station permits comparison with integrated totals from the chart. A running check is made of important temperatures and comparison of draft losses guides in lancing or external cleaning. Coal and ash samples yield data needed to complete the checking job except for routine more or less common to all boiler operation.

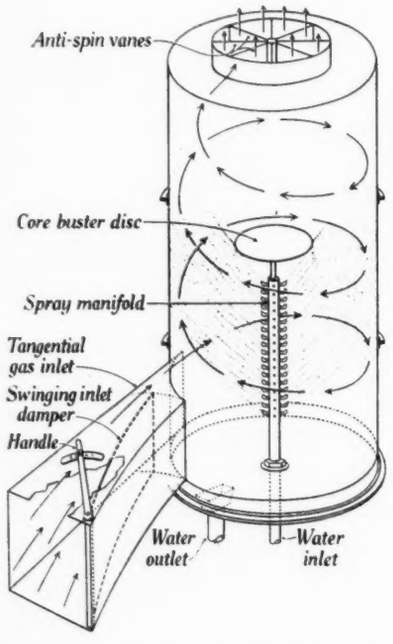
Dust Collection

► IMPROVED EFFICIENCIES and lower cost of collecting dust and flyash in cyclonic scrubbers was reported by R V Kleinschmidt. In the four years since the first full plant installation of Pease-Anthony scrubbers at the Kneeland St plant of Boston Edison Co, study of the aerodynamics of the collision of water droplets and small dust particles have led to finer atomization with smaller individual nozzles, resulting in higher collection efficiencies with reduced total quantities of water.

Cyclonic Spray Scrubbers

The cyclonic spray scrubber consists of a cylindrical chamber with a tangential gas inlet and a center column of spray nozzles. Finely atomized water spray is projected radially across the rotating gas stream so that water particles collide with and carry dust particles to the outer walls where they are washed down into a collecting and water-recirculating system.

Streamline flow around small water particles, said Mr. Kleinschmidt, does not affect so great an area ahead of and around the droplet and greatly increases the probability and number of collisions with the still smaller dust particles. Smaller nozzles than were originally installed provide considerable increase in collection efficiency with less water. The proper diameter



Elements of cyclonic-spray gas scrubber

and height of scrubber, of course, takes full advantage of the cyclonic effect of throwing wetted particles to the side walls.

Experience with rubber-lined pump casings and rubber-coated impellers as well as rubber-lined piping has indicated minimum maintenance problems due to corrosion. Some sulphur removal is obtained by present units and the efficiency in this respect can be increased at not excessive cost if and when public convenience and necessity require. The scrubber has been tried out in a full-scale test for cleaning blast-furnace gas, giving excellent performance from the operator's viewpoint, in comparison with other existing methods and alternate equipment.

Volume and Pressure Drop

A contribution to the literature on the relationship of gas volume and pressure drop in cyclone-type dust collectors was presented by Franklin Miller and Marcel Lissman of the Western Precipitation Co. Empirical formulas derived from test results of three sizes of single-tube cyclones analyze the effect of varying draft loss and increasing velocity.

Experience Report on Hydro Turbines and Meters

► PROPELLER-TYPE TURBINES and turbine-discharge metering were the principal subjects of discussion at the two sessions on hydraulics, 1940 ASME Annual Meeting. G R Rich and J F Roberts reviewed the TVA's Kaplan turbine plants, how turbine requirements are determined, power-station arrangements and noteworthy features of design, construction and operation.

Eight Kaplan turbines recently installed in the Pickwick Landing, Guntersville and Chickamauga TVA plants have a total capacity of 300,000 hp at rated head, and in physical size are among the largest in the country. With completion of Kentucky, Watts Bar and Coulter Shoals projects, the development will provide 650 miles of high-grade waterway, 9,000,000 acre-ft of flood storage, and 1,800,000 kw ultimate hydroelectric capacity. The turbines at Guntersville, Chickamauga and Pickwick Landing are rated 34,000, 36,000 and 48,000 hp and have runner diameters of 265, 264 and 292 in., respectively.

From experience gained at the three last-named plants, the authors concluded that Kaplan turbines with runners in the range of physical size from 22 to 24 ft in diameter may be satisfactorily designed, constructed and erected to meet the exacting demands of variable-head and -load service. However, this size range approaches the maximum practicable for such units that can be fabricated and erected with present facilities.

Adjustable Turbine Blades

R V Terry reported on a new turbine, on which the runner blades are pivoted so that they adjust themselves automatically to the most efficient angle for each condition of gate opening and head for constant-speed operation. Four installations of this type have been made, with a combined capacity of about 44,000 hp in five units. Mr Terry summarized the features of this type of turbine as follows:

(1) Blade-operating mechanism is entirely separate from the governor-oil-pressure system and is controlled by flow of water through the turbine. No extra governor equipment is required, and all oil piping is eliminated.

(2) Blade-adjusting mechanism is concentrated in the turbine proper, reducing interdependence of turbine-generator and governor design. (3) Turbine and generator shaft couplings are of standard construction, the same as for fixed-blade units. (4) For normal blade adjustment, forces and moments required to actuate the blades are a minimum due to location of pivot points and use of roller bearings.

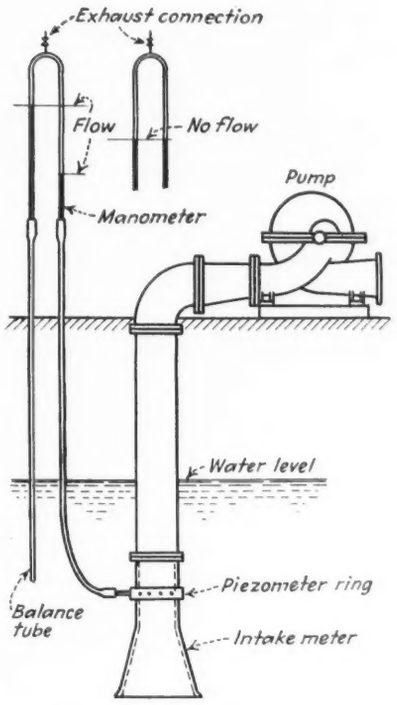


Diagram of an intake meter

(5) Blades open when turbine is started, thus tending to protect the main thrust bearing. (6) Blades open at runaway speed, appreciably reducing overspeed and cost of generator. (7) Heavy grease is used in the hub instead of heavy oil. (8) Blades have inherent tendency to adjust themselves to operating conditions.

(9) Blades follow gates rapidly on quick shutdown, greatly reducing lifting effect and forces on the blades. (10) There is provision for automatic suppression of vibration with free air in case of overspeed.

J D Scoville gave the results of governor tests made on the Kaplan turbines in the Bonneville plant of the U. S. War Dept and in the Guntersville plant of TVA. These units have valves that automatically admit air below the cover plates, when vacuum exceeds a predetermined value. It was found that admitting air above the runner during a large load rejection greatly improved speed regulation. Without these valves the vacuum reached 30 in. of mercury and prevented the governor from bringing the unit quickly under control after a heavy load rejection.

At the Safe-Harbor plant of Safe Harbor Water Power Corp a system of water measurement has been installed to meter water to each turbine and also to give total water taken by the station. The suitability of cerain piezometer systems and the research work done to determine and develop a suitable type of flowmeter were discussed by J M Mousson. This was previously described in POWER, October and November, 1940, "Safe Harbor Hydro Plant Meters Water Flow."

Annis Intake Meter

At the session on fluid meters, sponsored by the Special Research Committee on Fluid Meters, M B MacNeille and Russell K Annis described the Annis intake meter, an instrument for measuring flow at the intake end of closed conduits. This meter consists of an intake nozzle with a piezometer ring around its throat, attached to the intake end of a pipeline, such as the suction of a pump (see illustration).

An inverted U-tube manometer is placed at about the same elevation as the pump; one end of the manometer is connected into the piezometer ring and the other is carried down below the water level with a rubber hose. Air is drawn from the top of the manometer until water rises about one-third up its legs. Then when the pump is started, the differential of elevation in the manometer is a measure of the flow. The error to be expected with this meter from any one reading is $\pm$ 0.5%, provided proper precautions are taken and a manometer is used suitable for reading to this point of accuracy. Greater accuracy can be obtained if several readings are averaged.

Other papers presented at this session were: "Effects of Ambient Temperature on the Coefficients of Venturi Meters," by W S Pardoe; "Discharge Coefficient of Long-Radius Flow Nozzles When Used with Pipeline Wall Taps," by H S Bean, S R Beitler and R E Sprenkle; and "Calibration of Volumeters," by E E Ambrosius.

Progress in Boiler Design

▶ SETTINGS acceptable for natural-draft installations fail to meet the needs of modern high-capacity boilers with high draft losses and high negative pressures in gas passages between furnace and induced-draft fan, said M H Kuhner, Chief Mechanical Engineer, Riley Stoker Corp, in his paper "Steel Encased Settings for Modern Steam-Generating Units". Leaky settings mean lower boiler efficiency, higher auxiliary power, reduced capacity, contaminated boiler-room air, possible serious slagging and difficulty in securing correct combustion-control adjustment.

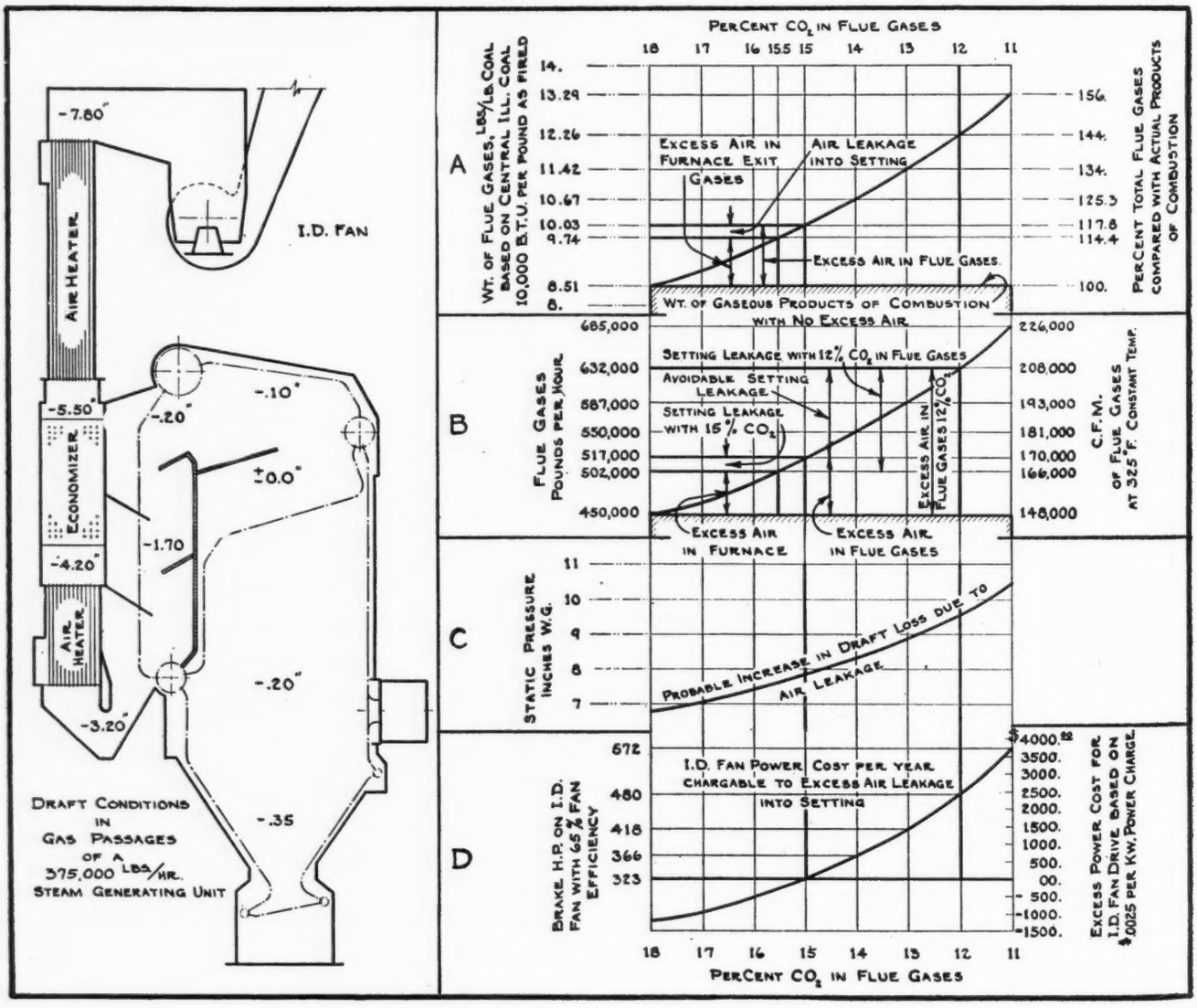
Minimum requirements for a correctly constructed setting are: (1) complete and permanent air tightness, (2) strength to withstand high internal pressure and occasional furnace puffs and minor gas explosions, (3) independence from pressure parts to permit free movement and avoid expansion stresses, (4) efficient heat insulation for low radiation loss and comfortable outside temperature, (5) permanency not less than the life of the boiler, (6) structure free from voids and proof against development of voids in service, (7) reasonably light weight, (8) reasonable cost, and (9) pleasing appearance. With proper design, Mr Kuhner said a self-supporting casing will meet all these requirements.

Effect of Leakage

To show the effect of air leakage on induced-draft-fan performance, Mr Kuhner presented data on an actual unit equipped with a completely air-tight steel casing. If, instead of 15,000 lb of air leakage per hour, the leakage were a possible 130,000 lb per hr, fan brake horsepower would go from 323 to 480 and at 2.5 mills per kwhr fan power for handling excessive leakage would run to $2400 per year.

While it is not practical to design a setting to withstand any possible internal pressure created by an explosion, experience shows that a steel-cased setting designed to stand a pressure of 50 lb per sq ft in the furnace and 75 lb per sq ft in the gas passages without exceeding commonly permissible deflection in external steel members is remarkably immune to damage from common furnace and gas-pass explosions. In Mr Kuhner's opinion, no amount of explosion-door area possible will prevent serious damage from a severe dust or gas explosion; a correctly designed steel jacket

Fig. 1—Draft conditions in a 375,000-lb-per-hr boiler and effect of excessive air leakage into setting


-7.80"
AIR HEATER
I.D. FAN
-5.50"
ECONOMIZER
-4.20"
AIR HEATER
-3.20"
-.10"
-.20"
±0.0"
-1.70
-.20"
-.35
DRAFT CONDITIONS IN GAS PASSAGES OF A 375,000 LBS/HR. STEAM GENERATING UNIT
PERCENT CO2 IN FLUE GASES
18 17 16 15.5 15 14 13 12 11
A
WT. OF FLUE GASES, LBS/LB. COAL BASED ON CENTRAL ILL. COAL 10,000 B.T.U. PER POUND AS FIRED
14. 13.29 12.26 11.42 10.67 10.03 9.74 8.51 8.
EXCESS AIR IN FURNACE EXIT GASES
AIR LEAKAGE INTO SETTING
EXCESS AIR IN FLUE GASES
WT. OF GASEOUS PRODUCTS OF COMBUSTION WITH NO EXCESS AIR
156. 144. 134. 125.3 117.8 114.4 100.
PERCENT TOTAL FLUE GASES COMPARED WITH ACTUAL PRODUCTS OF COMBUSTION
B
FLUE GASES POUNDS PER HOUR
685,000 632,000 587,000 550,000 517,000 502,000 450,000
SETTING LEAKAGE WITH 12% CO2 IN FLUE GASES
AVOIDABLE SETTING LEAKAGE
SETTING LEAKAGE WITH 15% CO2
EXCESS AIR IN FLUE GASES 12% CO2
226,000 208,000 193,000 181,000 170,000 166,000 148,000
C.F.M. OF FLUE GASES AT 325° F. CONSTANT TEMP.
EXCESS AIR IN FURNACE
EXCESS AIR IN FLUE GASES
C
STATIC PRESSURE INCHES W.G.
11 10 9 8 7
PROBABLE INCREASE IN DRAFT LOSS DUE TO AIR LEAKAGE
D
BRAKE H.P. ON I.D. FAN WITH 65% FAN EFFICIENCY
672 480 418 366 323
I.D. FAN POWER COST PER YEAR CHARGABLE TO EXCESS AIR LEAKAGE INTO SETTING
$4000.00 3500. 3000. 2500. 2000. 1500. 1000. 500. 00. -500. -1000. -1500.
EXCESS POWER COST FOR I.D. FAN DRIVE BASED ON $.0025 PER KW. POWER CHARGE.
18 17 16 15 14 13 12 11
PERCENT CO2 IN FLUE GASES

constitutes one form of insurance against explosion damage.

In the usual steel-cased setting, with firebrick tile on the furnace side and insulation between tile and casing, the temperature difference between hot face and cold face of the refractory is comparatively small and refractory expansion is more uniform. Absence of thermal stresses will tend to prolong refractory life even though average refractory temperature is higher than for a solid brick wall. Further advantages of steel-cased settings are light weight (about 33 lb per sq ft of wall area to 225 for a solid refractory setting 22½ in. thick), ability to withstand seismic shocks and suitability for outdoor installations. In the latter case, the saving in building cost will amply justify added outlay for a steel-cased setting.

Discussors of Mr Kuhner's paper emphasized the need for a truly tight setting on the modern boiler, and the difficulty introduced by the need for explosion doors. The concensus was that the answer lies in preventing explosions rather than in attempting to provide relieving capacity.

Twin-Furnace Boilers

By using two furnaces for a single boiler, instead of the usual one, the area of cooling surface for a given furnace volume can be increased, thus giving a lower gas temperature at the entrance to the tube bank and decreasing slagging possibilities. John Blizard and A C Foster, of Foster Wheeler Corp, in their paper "Some Particulars of Design and Operation of Twin Furnace Boilers", pointed out advantages: (1) possibility of controlling superheat over a wide range by differential firing, and (2) quicker start up.

In the twin-furnace boiler of Fig. 2 (Ohio Power Co, Power, West Va.) two rows of tangent tubes screen radiation from one furnace to another and substantially prevent passage of gas. Steam-and-water mixture from the division-wall tubes passes to water-wall tubes in the two furnaces, one fully watercooled, the other with one wall of radiant superheating surface. In order, the water-steam circuit comprises waterwalls, boiler tubes, radiant superheater and convection superheater. Gas from both furnaces passes over the latter.

In a single-furnace boiler, with a convection superheater, the smaller gas flow at low ratings would require large superheater surface to get high superheat without bringing gas temperature into the slagging range. In the twin-furnace boiler, steam leaving the radiant superheater has a higher temperature at low ratings, resulting partly from the characteristic of radiant superheaters and partly from firing the superheater furnace at a higher rate than the other, at low loads. Tests show that a wide range of final temperatures can be obtained satisfactorily and that the unit can be started in 8-12 hours without imposing undue strain on pressure parts. There has been no outage or loss of capacity due to slagging; soot blowing and a small amount of hand lancing keeps the unit clean.

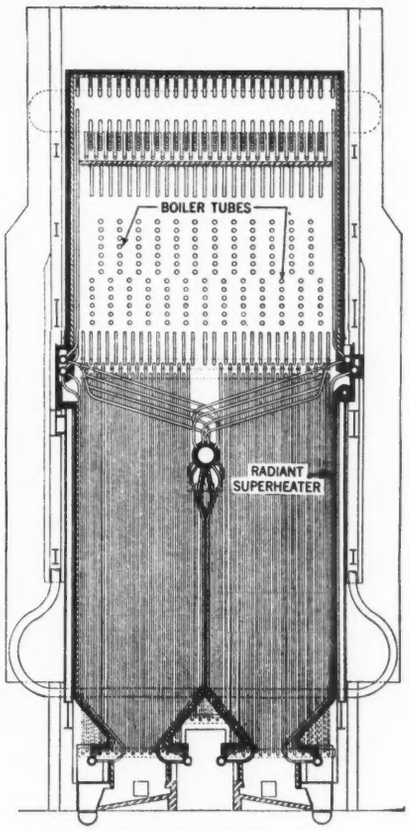


Fig. 2—Twin-furnace boiler; one furnace completely watercooled, one with three sides waterwall and one side radiant superheater

Other possible 2-furnace arrangements include: (1) units in which gas from a separately fired radiant superheater furnace passes through a furnace with no superheater, and (2) units with gas from two furnaces passing over a convection superheater and no radiant superheater. Twin-furnace units are inherently dry-bottom; slag tapping would probably introduce a lag which would hamper control.

Reasoning from the simplest evaporating circuits to the complex ones found in modern practice, John Van Brunt, Combustion Engineering Co, developed a detailed analysis of the circulating system, showing how, after basic assumptions are made, entrance, exit, friction, and acceleration losses can be calculated and compared with available heads. The results indicate circulation is adequate for current types of high-pressure units where low headroom does not restrict height and so reduce net circulation forces.

Discussion centered around the difficulties involved in calculating entrance and leaving losses, the possible discrepancies introduced by non-uniform heat absorption, the need for checking both assumptions and results with actual field data. Opinion divided as to whether the limit on natural-circulation designs has been reached; at the moment natural vs forced circulation seems to be an economic question. It was pointed out that if pumping power is held to reasonable limits, forced-circulation offers little that good natural circulation design can't meet and so would not guarantee the end of tube troubles.

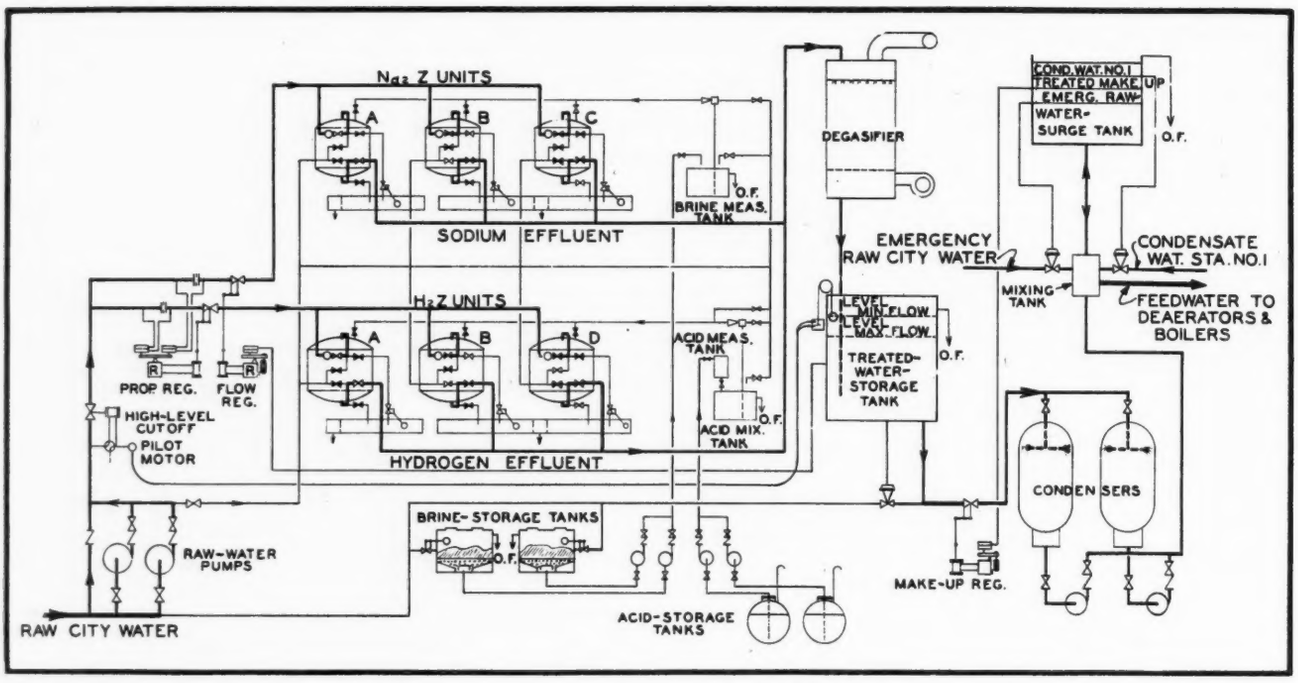
Compact Steam Plant

Need for a compact steam plant that would be efficient, powerful and directly reversible led to the development of a unique high-speed compound uniflow engine and forced-circulation boiler whose performance was reported on by S L G Knox, consulting engineer, and Prof J I Yellott, Illinois Institute of Technology. Piston inlet valves with serrated edges provide for expansion on both forward and reverse, not found in previous steam-reversing engines, and for automatically increasing torque at starting and low speeds. These extra functions are performed without introducing more moving parts than the minimum number required for a simple non-reversing engine.

In the Knox boiler, feedwater enters two drums which supply downcomers leading to two lower headers. These feed a lower middle drum fitted with a simple impeller running its entire length. This impeller provides forced-circulation in the riser tubes running from the lower middle drum to the two upper drums. Tubes are arranged to form a horizontal cylindrical furnace, into which oil burners fire. Advantages claimed for this construction are: (1) stability resulting from having a water level eliminates need for highly sensitive controls, and (2) the unusual pumping arrangement insures uniform distribution of water to riser tubes. This boiler operates with a heat release of 435,000 Btu per cu ft; efficiency of 81.3% was reported. Weight of boiler per lb of steam approximates 0.6 lb.

Two sessions on heat transfer included the following papers: "The Radiation of Furnace Gases", by H C Hottel and R B Egbert; "Heat Transfer to Hydrogen-Nitrogen Mixtures Inside Tubes", by A P Colburn and C A Coghlan; "Vaporization Inside Horizontal Tubes", by W H McAdams, W K Woods and R L Bryan; and "Remarks on the Analogy between Heat Transfer and Momentum Transfer", by L M K Boelter, R C Martinelli, and Finn Jonassen.

New Slants on Feedwater Conditioning



Water circuit for the sodium Zeo-Karb makeup-treatment system at Waterside Station No. 2, Consolidated Edison Co. *A*—Valves set for softening, *B*—Valves set for backwash, *C*—Valves set for regeneration, *D*—Valves set for rinse

▶ CONDITIONING BOILER FEEDWATER is still probably the most newsworthy subject in any engineering meeting. Reporting on the 1,200,000-lb-per-hr make-up-treatment plant installed to supply the 1400-lb boilers at Waterside Station of the Consolidated Edison Co of New York, C B Arnold, R T Hanlon and J Mindheim gave construction and operating details of the largest combination of hydrogen and sodium Zeo-Karb arrangement yet built.

Designed to handle water of only 65 ppm total solids content, this system permits high makeup to be carried on the 1400-lb boilers when supplying 200-lb turbine exhaust to the district heating mains of the New York Steam Co. Electric load developed from this steaming capacity is generated, according to the authors, at only 5000 Btu per kwhr. The treatment plant, in operation about a year, has resulted in no visible deterioration of internal boiler surfaces and economizers are free of deposits or corrosion.

Part of the water, 50-62%, passes through the hydrogen units, the remainder through the base-exchange. Mixed in controlled proportions in a degasifier, CO_2 produced by the chemical reactions is vented before the treated water passes to the condenser of an operating turbine for deaeration. A deaerating heater completes the necessary oxygen removal.

Three pairs of units permit operation of any two, each rated at 600,000 lb per hr. Regenerating solutions, salt for the base-exchange and sulphuric acid for the hydrogen, are stored under safe conditions in special tanks. Backwashing is carried out under a carefully devised routine, although the operations have been standardized and checkup is performed by the operating crew. A pH recorder checks performance of the combined units.

Continuous Blowdown

Continuous blowdown through orifices designed for 1, 2, and 4% of the boiler capacity can be regulated from 1 to 7% of maximum steam output. Of the blowdown, 29% is flashed at 200-lb pressure and 13% at atmospheric pressure supply to feedwater heaters. Total solids in the boiler drums are kept below 450 ppm.

Maintenance of the unit has thus far been negligible with no indications of an increase in the future. No problems have arisen, state the authors, from an operating point of view, either in regulating the operation, backwashing or handling salt and acid.

Silica trouble appears to be more prevalent in high-pressure boilers having high rates of heat input, according to Harold Farmer, Chief Chemist of Philadelphia Electric Co. Both the form and the condition in which the silica exists within the boiler are important, he said.

Internal chemical treatment has not proven very satisfactory. Silica is blamed for certain types of tube failures and experience indicates the necessity for maintaining the silica content below 15 ppm. Plants operating at pressures below 600-lb have not experienced serious trouble but higher pressure boilers have had failures in which silica appears to have played an important part even when the silica content of the boiler water has been less than 20 ppm.

Silica Pretreatment

A new magnesia process for silica removal was described by H L Tiger of the Permutit Co. It can be applied to any water of any temperature, according to the author, and can be carried out in conjunction with the usual precipitation water-softening process with little increase in operating cost.

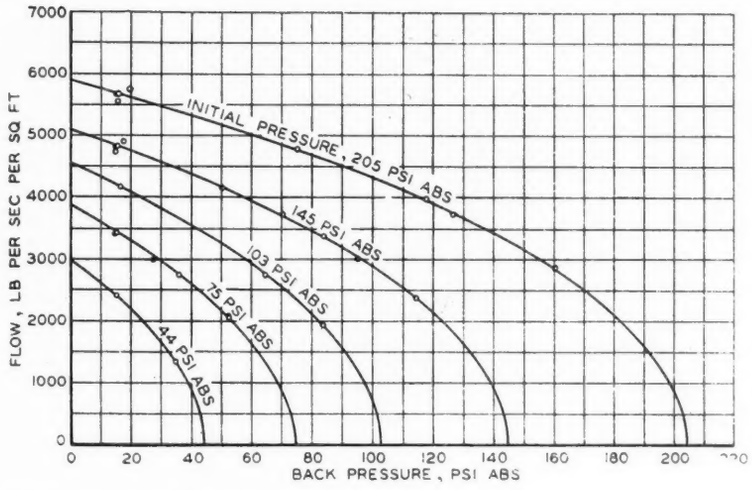
Magnesium compounds forming a sludge are recirculated in contact with the water to be treated. Silica is withdrawn along with a portion of the sludge. Certain forms of magnesia are

more efficient than others and efficiency of silica removal increases with concentration of the sludge in contact with the water, and with the water temperature.

One of the outstanding advantages of the process, he added, is the fact that the total solids content of the treated water is decreased, rather than actually increased, as is the case in some other forms of treatment.

Experience has been gained, according to a paper by L D Betz, C A Noll and J J McGuire, in the treatment of a natural water in which the silica content was reduced from 56 ppm to 1 ppm. The last traces of silica, said Mr Betz, are difficult to remove.

Corrosion Tests of Condenser-Tube Materials



In studying use of orifices for cascading heater drains, the Detroit Edison Co. determined flow of saturated water through thin plates

▶ A SERIES OF TESTS with a miniature condenser extending over a 22-month period in Providence, R. I., river water showed aluminum brass condenser tubes superior in corrosion resistance to cupro-nickel, Admiralty metal and bronze, according to a report presented by C W E Clarke, A E White and C Upthegrove. Conditions were maintained, it was stated, as closely as possible like those in a working condenser for one series of tests; another series of impingement tests aided classification of materials in order of their resistance to this form of attack.

Seaboard Conditions

Remembering, the authors cautioned, that the test results apply only to the specific water conditions at the Narragansett Electric Co plant, certain conclusions are possible: (1) aluminum brass is superior to other materials tested, (2) hard-drawn and annealed materials may perform equally well, (3) internal stresses—cracking under mercurous-nitrate test—do not necessarily decrease the corrosion resistance of the tubes, (4) arsenic content varying between 0.01% and 0.07% does not appear to be a controlling factor, (5) phosphorous, in traces, does not appear to have a serious effect on the results. (6) proper manufacturing procedure is an important factor in the production of highly corrosion-resistant aluminum-brass tubes.

Of the two tests, the condenser test was considered of primary importance, although the impingement tests check to a surprising degree the results of the former. Impingement tests were conducted by spraying water at 90 F against the inner surface of split-tube samples. Impingement attack varied from localized deep-pitting to very slight general roughening of the surface with aluminum brass much the better, in general, than Admiralty. "Black-skin" treatment of Admiralty metal is not effective in increasing the resistance to impingement corrosion.

Piping Models

A mechanical method for solving problems involving high-temperature piping expansion by use of small diameter steel rod was described by F M Hill, Commonwealth and Southern. Solid rods, on the order of ¼-in. diameter, are bent to simulate three-dimensional piping systems with branches, headers and other restraining components; the end reactions and moments are measured by a system of micrometer heads, moment arms and needle indicators.

Mechanical methods possess time-saving advantages over calculation for complicated piping runs and afford opportunity to observe and analyze the effect of changes in arrangement of supports. A satisfactory check with calculation methods of determining reactions, presented in the paper, lends confidence in results of mechanical measurement.

Flow of boiling water through pipes, such as are found in draining condensate from feedwater heaters, has been investigated by M W Benjamin and J G Miller of The Detroit Edison Co. Practical design formulas, derived in the course of experimental tests, have been successfully applied to throttling orifices but should not be applied to metering.

Greater Actual Flow

Actual flow of saturated water can amount to several times the theoretical quantity. Curves on this page give sufficient data for most applications. No flashing occurs until after the water is through the orifice, according to the authors, but even a small amount of steam in the mixture ahead of the orifice has considerable effect on the quantity of mixture passed. Data given applies only to orifices, and pressure drops do not include piping losses downstream of the orifice or in nozzles or tubes.

A report of the effect of grain size and structure on carbon-molybdenum pipe contained a number of photomicrographs of the material under various conditions of heat treatment. These were presented by A E White and Sabin Crocker to show grain size and grain structure with creep properties. Greater emphasis, the paper concluded, should be placed on the type of carbide structure.

A continuous sample of either steam or condensate, free from dissolved gases, but with original dissolved solids present, can be furnished by a new degasifying steam condenser for use in conductivity determinations described by F G Straub and E E Nelson, University of Illinois. Seven of these have already been installed in power plants varying in pressure from 150 to 1250 lb and a quantity of data has already been collected.

Lubrication Practice and Bearings

▶ AT PREVIOUS ASME ANNUAL MEETINGS, lubrication papers have not been, for the most part, of much interest to operating engineers. This year, however, it's a different story. "Lubrication of General Electric Steam Turbines", by C Dantsizen, gives lube-oil experience with steam turbines operated at GE's Schenectady Works powerhouse, and describes a simple laboratory apparatus for determining rusting tendency of oil. It was found that many new oils on the market, when tested with this system, permitted water rusting of steel specimens, and these same oils in service did not prevent rusting in some turbine installations.

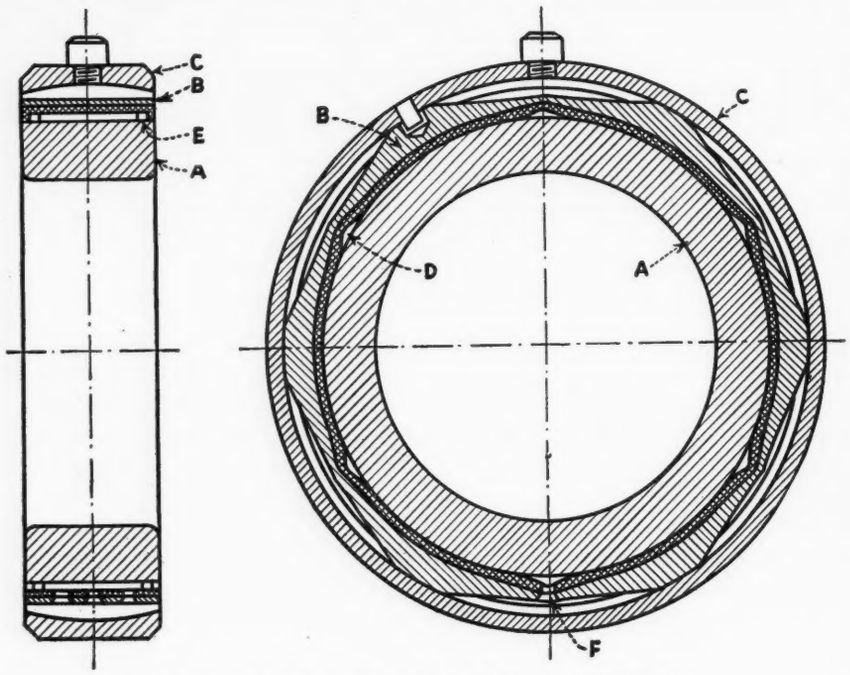
Several remarkable facts were uncovered concerning the oil used to lubricate the Schenectady-Works-powerhouse turbines. Engineers discovered that new unused oil will, when agitated with water, allow rust to form on iron, whereas oil which had been in use on the same turbine for several years and which had a neutralization number of 0.7, inhibited rusting. They also found that this used turbine oil is a very effective rust inhibitor when mixed with new oil in proportion even as low as 1% of used oil to 99% new oil.

With new oils which have not been rust-inhibited, the author suggested, providing the oil supplier approves, a 10% addition of well-used oil of the same brand be added to the new oil when first starting up a new turbine. He also advised that, when a new turbine is put into service, water entrained in the oil be held to a minimum.

Good Lubrication Methods

Few industrial plants have the variety of lubrication requirements found in the machinery and processing equipment at the Eastman Kodak Co's plant. Extremes of operating conditions exist, such as bearings running at temperatures from —40 F to more than 400 F, at extremely high and low speeds and exposed to chemical fumes, abrasive dust, water and solvents. Many other such factors complicate the lubrication problem. Methods and practices at this plant were presented by Virgil M Palmer and Charles L Pope.

Proper lubrication of equipment begins with its design; therefore, to insure satisfactory provisions for lubricating equipment being purchased or designed, the company has adopted a specification covering the requirements to be met. A standard list of lubricating devices that are recommended and stocked is supplied to all engineers, draftsmen, maintenance men and purchasing agents through the company's material-standards department.



Cross-section through multiple-oil-film radial bearing

As a result, the number of devices has been reduced, which makes it possible to stock immediate requirements economically. For lubricating cylinders using saturated steam at 70 lb, a chart is used based on 1,500,000 sq ft of area rubbed by the piston per gal of oil. Experience has shown that small-size pumps require slightly more oil than do large units.

The authors also pointed out that good practice for grease-lubricated anti-friction bearings indicates that a bearing housing should be about one-third full of grease. To prevent overgreasing bearings, the following procedure is followed: With the machine running, the bearing drain plug is removed and grease is forced slowly into the bearing until fresh grease starts to run from the drain. The equipment is then run for five minutes before the drain plug is replaced.

Gustave Fast described a multiple-oil-film radial bearing, which is much shorter than any plain bearing now in use (see diagram). Several types of this bearing have been developed and tested. The bearing normally consists of three parts: A hardened, ground and lapped journal hub *A* mounted directly on the shaft with a shrink fit; a polygon-shaped, flexible, continuous block sleeve *B* with spherical abutments mounted in keeper sleeve *C* having an internal spherical surface to provide self-alignment for sleeve *B*.

Transverse oil grooves *D* divide the bearing surface into a number of small blocks deflected by the oil-film pressure to form wedge-shaped films. Grooves *D* communicate at each side on the bearing with a circumferential oil-distribution groove *E*. Oil is drawn up through hole *F* in sleeve *B* by the viscous pump action of the rotating journal hub. An abundance of oil is thus circulated, assuring an ample supply for any speed requirement without excessive splashing or churning of the lubricant. Because of this lubrication arrangement, a radial load can be taken in any direction with equal efficiency.

Length of this bearing varies somewhat with size, but may be taken as about 0.25 of the diameter. Because of the shortness of the bearing, there is very little deflection across the journal surface; consequently, high unit pressures can be carried with safety.

Other papers presented at the lubrication session were: "Friction Torque in Ball and Roller Bearings", by Haakon Styri; "Power Losses in High-Speed Journal Bearings", by F C Linn and D E Irons; "Flow Properties of Lubricants Under High Pressures", by A E Norton, M J Knott and J R Muenger; and "Relationship of Viscosity to Rate of Shear", by L J Bradford and F J Villforth, Jr.

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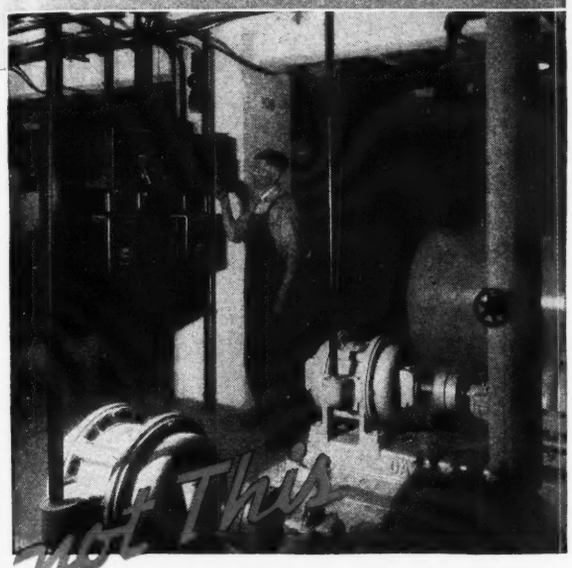

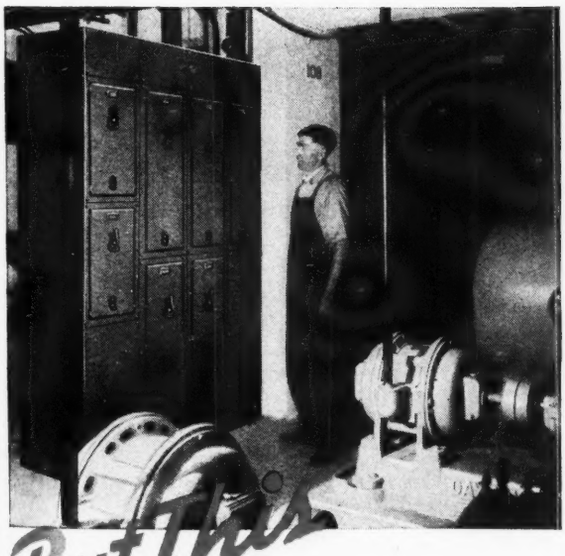

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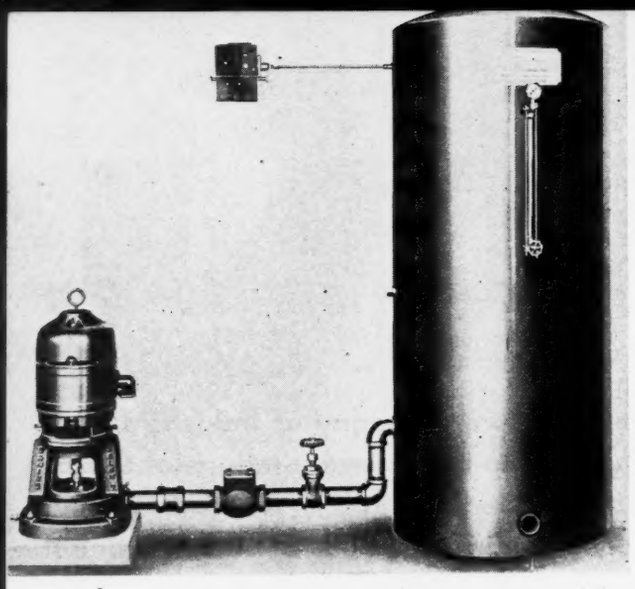

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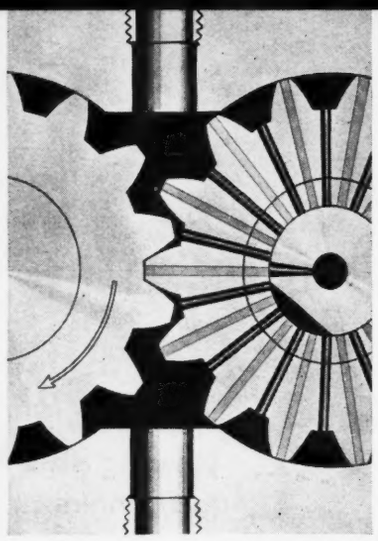

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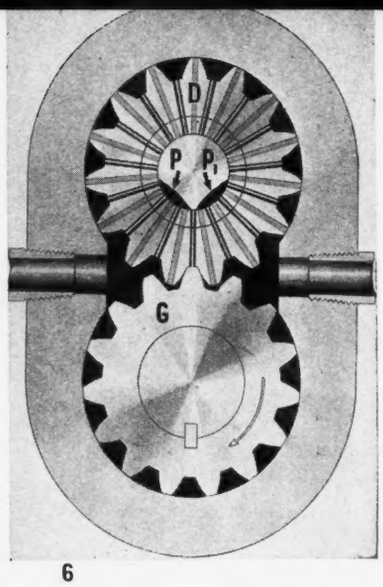

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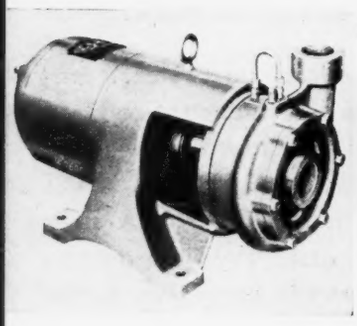

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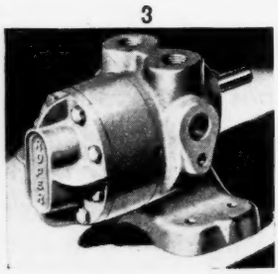

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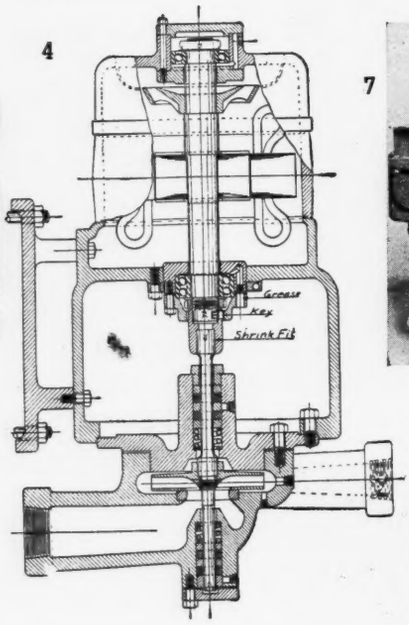

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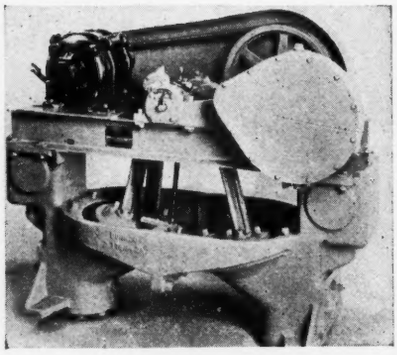

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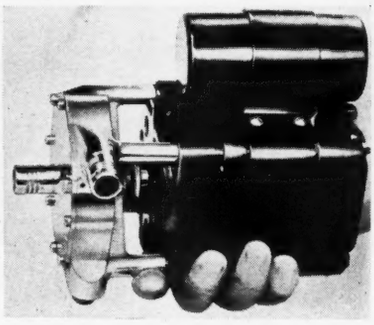

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thus, the more water pumped, the more cooling capacity of jacket. Strainer can be interchanged between pump and foot valve, when pump is not operated submerged. *Sawyer Electrical Mfg Co, 5715 East Leneve St, Los Angeles, Calif.*

1 TURBINE PUMPS—"Minuturb" deepwell turbine pumps utilize vertical solid-shaft motor coupled to stainless-steel stuffing-box-shaft by adjustable coupling. Capacities of system range from 15 to 80 gpm from deepwells 4-in or larger inside diameter. Black tanks are supplied with systems of either 220- or 315-gal capacity as standard equipment. *Deming Co, Salem, Ohio.*

2 CENTRIFUGAL PUMP—"Monobloc" centrifugal pumps have pump and motor built integral with each other, and come in sizes from 1 to 4 in. with capacities to 100 gpm against heads up to 280 ft. Drip-proof motor features direct flow of ventilating air which prevents drawing moisture into motor. Pumps require minimum floor space, yet have ample room to repack stuffing box. *Worthington Pump & Machinery Co, Harrison, N. J.*

3 ROTARY PUMP—New line of pumps includes those with capacities from 1 to 100 gpm, and speeds up to 1800 rpm against pressures up to 1000 lb psi. Feature of new pump said to be "hydraulic balance", which equalizes internal pressure at all points and absorbs all shock or thrust from power end of drive shaft. *Geo D Roper Corp, Blackhawk Park Ave, Rockford, Ill.*

4 CENTRIFUGAL PUMP—Feature of centrifugal pump is small, stainless-steel hardened shaft, separable from motor shaft, extending through impeller to water-lubricated bearing. End thrust is carried by double-row ball bearings, so mounted that endwise adjustment of shaft is provided to take up wear on wearing ring on suction side of impeller. Pump shown has closed impeller, but unit can be furnished with open type. *Condenser Cleaners & Mfg Co, 530 First Ave, Pittsburgh, Pa.*

5 & 6 ROTARY PUMP—Spur-gear rotary pump (6) has gear teeth so formed that a rolling action takes place between them over substantially their whole contacting area. Driving gear *G* is keyed to its shaft while driven gear *D* rotates freely on its shaft, which has fluid directing grooves *P* and P_1 machined into it. Radial holes to tops and roots of teeth of driven gear permit return of fluid trapped between the teeth, to discharge of pump through port *P*. This feature allows each tooth to fill completely the space between mating teeth without building up excess pressure that would overload the bearings and cause noisy operation. Ordinarily when such close-mating teeth start to separate a vacuum would be created. This is prevented, however, as fluid from suction chamber of pump can freely flow through port P_1 and up between the parting teeth. On a constant-displacement-type pump shaft driven gear is fixed in position shown in (5) to give most efficient operation. For variable-displacement type, shaft in driven gear is arranged so that it can be turned through an arc of a few degrees. If, in (5), the shaft is rotated clockwise through a few degrees, a direct passage is made through holes in teeth and port *P*, allowing flow of fluid from discharge back to suction. By this method, pump discharge can be varied over a range from full to about 66% capacity. These pumps include patented features of tooth construction and are suitable for pressures up to 1000 lb psi. Available in six sizes, according to width of gear face. *John S Barnes Corp, Rockford, Ill.*

7 DUPLEX DIAPHRAGM PUMP—Dorrco V-type pump is improved diaphragm pump designed for handling sludges, pulps or slimes containing appreciable quantities of solid materials. Variation in plunger stroke from ⅜ to 3 in. while pump is running can be made by turning crank. This gives 5 to 1 range in discharge rate. Other advantages claimed include higher mechanical efficiency and acid-proof construction. *Dorr Co, Inc, 570 Lexington Ave, New York, N. Y.*

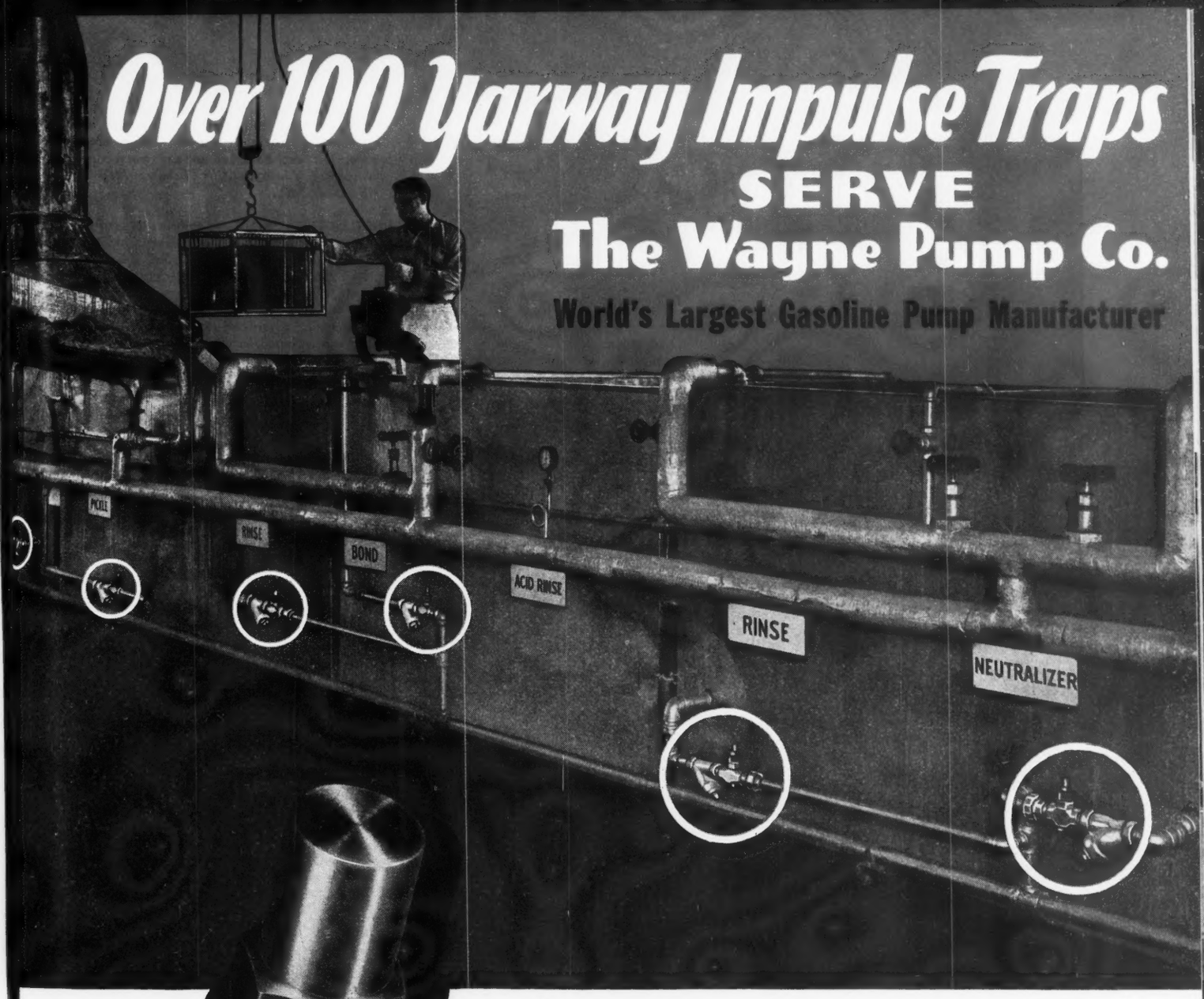
8 MIDGET CENTRIFUGAL PUMP—Model D midget is designed for use in all industrial plants, laboratories, etc, where thin liquids are to be handled. Unit weighs 14 lb, and maximum pressure is 17 lb psi, total capacity 5 gpm. *Eastern Engineering Co, 45 Fox St, New Haven, Conn.*

CENTRIFUGAL PUMP—Smithway is combination of fully-enclosed self-protected electric motor with centrifugal pump in single frame. Pump is constructed so that water or other liquid pumped passes through thin tubular shell of motor, providing continuous cooling. Powered with tubular-type motor of from ½ to 10 hp, unit handles from 20 to 200 gpm

(Continued on Page 102)

Over 100 Yarway Impulse Traps SERVE The Wayne Pump Co.

World's Largest Gasoline Pump Manufacturer



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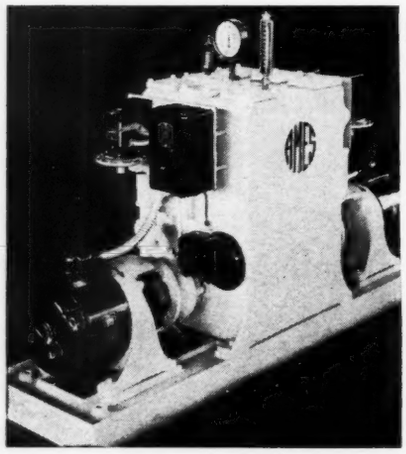
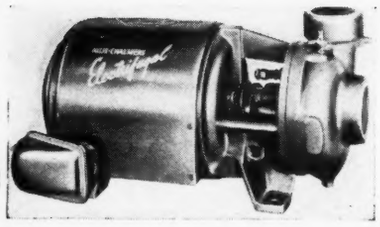


against heads up to 250 ft. *Smith Meter Co, Los Angeles, Pa.*

1 VACUUM-RETURN UNIT — Ames unit produced to meet demand for improvements in design and performance required by modern types of selective pressure-and temperature-controlled vacuum- and gravity-return heating systems. System said to be vibrationless pumping equipment, with two motor-pump units, cast-iron storage receiver and air separator, vertically accessible bronze strainer, etc, with complete electric control. Features include automatic motor starter, balanced motor-pump unit, shaft packing not under vacuum, no bearing adjustments, and no noisy shaft coupling. *Ames Hydrovac Corp, 290 Scholes St, Brooklyn, N. Y.*



2 CENTRIFUGAL PUMP — "Electrifugal" pump is all-in-one centrifugal pump designed as complete motor and pump built on one shaft and one housing. Instead of using standard motors having special end housings and shaft extensions, unit has special motor with one-piece cast-iron motor yoke and pump bracket. Feet are cast integral with housing and bracket and extend under entire unit instead of under motor only. For normal service pump is built with cast-iron casing, bronze fitted, but can be made in any metal suited to special industry. *Allis-Chalmers Mfg Co, Milwaukee, Wis.*

BOILER-FEED PUMP — "Pressure-Equalizing" pump is smaller, less expensive model of pump used in larger industries. Overcomes boiler pressure by admitting pressure into pump receiver, which is like a return trap. Assembly consists of cylindrical receiving chamber and a vertical, close-coupled centrifugal pump mounted on cast-iron base. This base has pipe cast integrally which connects receiver to pump suction. Stationary electrodes are suspended into top of receiver and control solenoid-operated valve mounted between pump and receiver. *Johnson Corp, Three Rivers, Mich.*

PUMP BEARING—Bearing has been created by heavy application of electrolytically deposited chromium over a Monel stainless-steel sleeve which has been swedged into a vertical pump shaft. Because of extreme hardness and thickness of chrome and its bearing contact with cutless rubber, no abrasion occurs, according to company engineers. *Peerless Pump Co, 301 W Ave, Los Angeles, Calif.*

WELDING

1 AC WELDER—"Arcmaster" welder features multiple-coil transformer design to assure even flow of current to electrode, improved safety construction and low cost. Circuit on output cannot be completed till actual welding takes place. Each unit includes 20-ft ground cable, 20-ft electrode cable, head shield, rod holder and assortment of rods. *Bear Mfg Co, Rock Island, Ill.*

2 WELDING TEE—Seamless-steel welding tees have metal placed at points of stress, instead of useless metal added throughout tee. Another improvement over old types, according to maker, is that longer outlets are provided for in lining up and welding. *Tube Turns, Inc, 251 East Broadway, Louisville, Ky.*

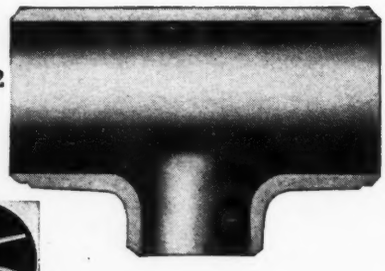
3 ARC TORCH—Designed to offset handicap of lack of suitable attachment for doing heating and welding jobs that demand an independent source of heat, torch will operate from any ac machine. Comes with cables, carbons, carbon adapters, copper terminal lugs, a 2 regular taper jacks. *Marquette Mfg Co, 409 Johnson St, N E, Minneapolis, Minn.*

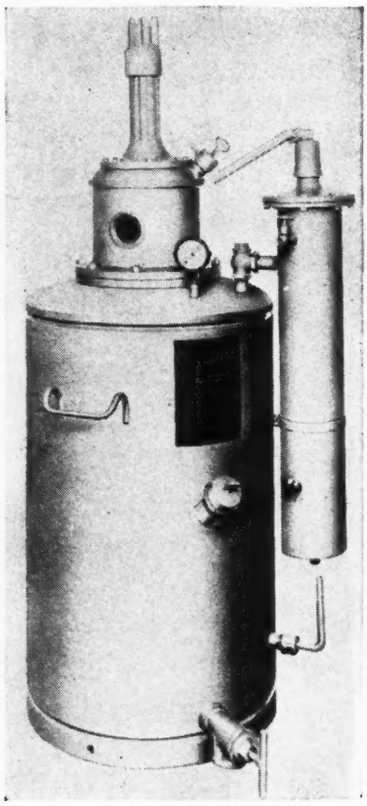
4 GOUGING NOZZLES—"Oxweld" nozzles provide means for removing narrow strip of surface metal from steel plate, forgings and castings. Nozzles are designed to deliver a relatively large jet of oxygen at low velocity. Illustration shows blowpipe with three standard nozzles available. *Linde Air Products Co, 30 East 42nd St, New York, N. Y.*

5 CHILL RING—Wedge backing or chill ring said to simplify welding operation. Spacing bead in center of ring gives uniform width, while with ring, operator can penetrate to inside of pipe with first layer of weld metal. This is said to eliminate main cause of weld failure in pipe welding. *Wedge Protectors, Inc, 9524 Richmond Ave, Cleveland, Ohio.*

6 ACETYLENE GENERATOR—Portable unit is filled by loosening four wing nuts, lifting hopper from generator and placing it bottom side up on floor. Carbide is then added through hole provided. Twelve gallons of water, or one gallon to every pound of carbide, are placed in main tank. Hopper can then be replaced and tightened down, and generator is ready for use. Charging rate can

(Continued on Page 104)





STRATEGIC POSTS FOR INDUSTRY

REVERE TECHNICAL ADVISORY SERVICE

In many plants and industries, Revere Technical Advisory Service men are working shoulder to shoulder with executives and engineers in solving defense problems by selecting a suitable type and form of copper or one of the many copper base alloys.

These are picked men, with broad backgrounds in metal-working methods, plus highly specialized knowledge of copper and copper base alloy characteristics and applications. They are supported in this work by the full cooperation of the Revere Research Laboratories and Revere Mills.

This Technical Advisory Service comprises a thoroughly equipped Research Laboratory, manned by engineers and metallurgists for (1) developing new and better Revere materials to meet active or anticipated needs of industry; (2) supplying specific and detailed knowledge of the properties of engineering and construction materials; and (3) continuously observing developments of science and engineering with a view to their utilization in the improvement of Revere production methods and equipment.

In addition a corps of technical men are available to (1) help industrial executives make use of data developed by the Revere research laboratory staff; (2) perceive the material problems existent in industrial plants contacted; (3) assemble data enabling Revere research laboratory men to study these problems; and (4) make practical tests of the materials recommended in the plants concerned.

This Revere Technical Advisory Service set-up has been very successful in reducing costs, improving products and increasing the output for many industrial concerns.

Its service is available to you with no expense or obligation on your part.

THE mills of Revere Copper and Brass Incorporated are strategically located in 6 industrial centers for speeding up America's defense program. They coincide to a remarkable degree with the great military strategic areas of industrial America.

This is fortunate for industries and manufacturers busy with defense needs. For the strategic location of Revere Mills speeds up the supplying and delivering of basic copper, brass, bronze or other copper alloy products to where they are made into finished defense products.

Equally important, it puts these same industrialists and manufacturers in closer touch with the Revere field organization and general staff—and especially with the Revere Technical Advisors. The Revere Staff has a successful record for helping men puzzled by defense tasks to get into quick, efficient production. There is a Revere man near you in one of Revere's 26 sales offices and ample Revere stocks at our numerous distributors. You can command these services at no obligation to yourself.

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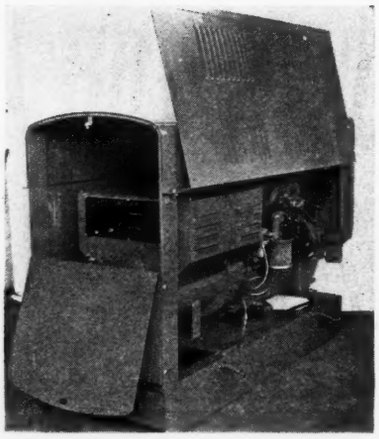
be adjusted by turning handwheel right or left, depending on pressure desired. Generator is automatic thereafter. *Marquette Mfg Co, Minneapolis, Minn.*

SPOT WELDER—Two-gun portable spot-welding unit designed to eliminate necessity for duplicate welding equipment in heavy-duty service. Unit is equipped with pneumatic tires and is wheeled from one assembly to the other. Only connections needed in new location are air lines, for air-hydraulic pressure booster; water lines, for cooling welding cables, points and transformers; and power lines. Progressive Welder Co, 3050 East Outer Drive, Detroit, Mich.

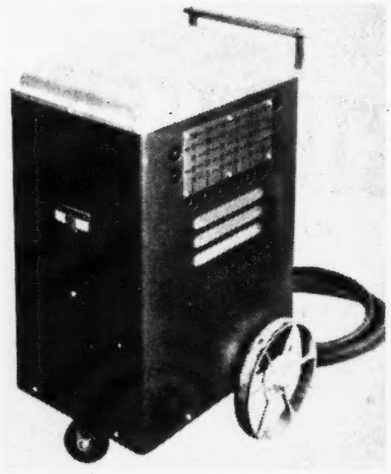
TEMPERATURE INDICATORS—"Tempils" are pellets, stamped with an identifying temperature, which melt or liquify when that temperature has been reached. In operation, pellets are placed on or against heated object. When pellet melts, object has reached temperature stamped on pellet. Available in 100-deg ranges, and on request may be obtained on 50-degree steps. Makers say they are not corrosive to metals, and do not leave pits or objectionable stains which cannot easily be removed. *Tempil Corp, 132 West 32nd St, New York, N. Y.*

HARD FACING ROD—Haynes "93" hard-facing rod is recommended for use where severe abrasion, with only moderate amount



of impact, is met. Contains chromium, molybdenum, cobalt, has tensile strength of 43,000 lb psi, and hardness, as deposited by oxy-acetylene welding, of 62 Rockwell C. *Haynes Stellite Co, 30 East 42nd St, New York, N. Y.*

ENGINE-DRIVEN WELDER—"SAE-200J" has single-operator generator (above) variable-voltage type, with laminated pole pieces. Current range of welding is 40 to 200 amp for either bare, washed or heavily coated electrode. Gasoline engine has 4 cylinders, and is capable of

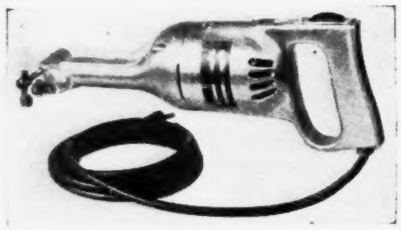


delivering 26 hp at 1800 rpm. *Lincoln Electric Co, 12818 Coit Rd, Cleveland.*

ARC WELDER—Portable arc welder (above) provides from 2 to 250 amps of welding current, available in 27 current steps. Current adjustment is accomplished by selecting current desired and inserting bayonet plugs into proper receptacles. Welder is self-contained, enclosed in steel case mounted on three wheels. *Westinghouse Electric & Mfg Co, East Pittsburgh, Pa.*

WRENCHES AND OTHER TOOLS

1 MICA UNDERCUTTER — Ideal direct-drive undercutter is for field or shop use where motor or brush-rigging is not removed. Other types available designed for use where brush rigging is removed. Motor and undercutting mechanism is cased in aluminum housing, and adjustable depth-gage and roller guide simplify operations. *Ideal Commutator Dresser Co, 1025 Park Ave, Sycamore, Ill.*



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2 TUBE CLEANERS—E P Series are 6-bladed, 2-cylindered air motors in which power developed is said to be increased because of 6 overlapping power impulses per revolution. Unique method of admitting air into cylinders insures positive starting, high torque and elimination of sticking due to incoming air holding blades in close contact with wall. Permanent seal between intake and exhaust areas said to insure continuation of original efficiency. *Thomas C Wilson, Inc, 51 Vandam St, New York, N. Y.*

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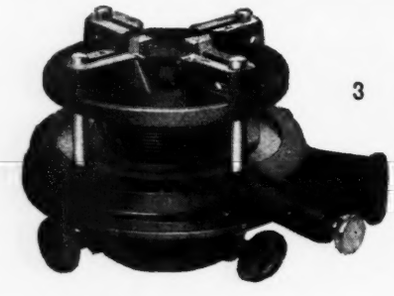

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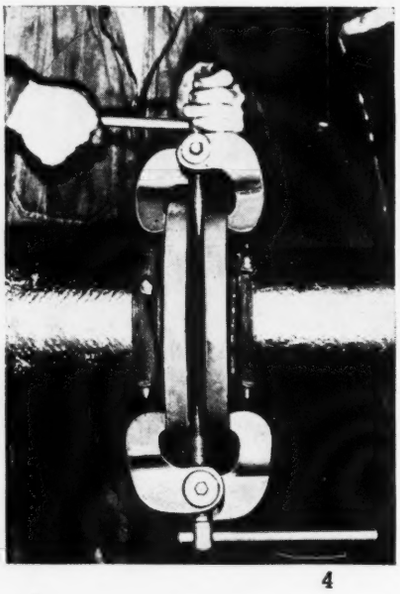

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3 RATCHET THREADER—Adjustable threader uses separate bushings for each size pipe to assure centering of pipe. Uses receding-die principle, with separate set of dies for each size of pipe. Has tubular handle 24 in. long, and has simple adjustment for over- and under-size pipe, as well as standard threads. *Toledo Pipe Threading Machine Co, 1431 Summit St, Toledo, Ohio.*

4 GASKET TOOL—"Flange-Jacks" are designed specifically to open flanges on pipelines for renewal of gaskets. In operation, two bolts are removed from flanges opposite each other. Jaws of jacks are placed in each bolt hole, and tightened enough to hold jacks in position. Remainder of bolts are then removed from joint. Jackscrews are tightened at same time to separate flanges evenly, with lubrication being applied freely at points and screws. When sufficient opening has been reached, old gasket is removed, and, after flange faces are cleaned, new gaskets are inserted. Jackscrews are then backed off simultaneously, jacks are removed and bolts applied. Illustration shows operator tightening screws. *Garlock Packing Co, Palmyra, Ohio.*

5 SOCKET WRENCHES—Sledge-type socket wrenches available for handling large nut-turning jobs in power plants, etc, where big nuts must be down tight. Anvil end of wrench takes sledge hammer blows as nuts are tightened. Companion sockets are used where obstructions must be cleared or to reach buried bolt heads. Available in sizes from 1 7/16 to 4⅜ in. *Snap-On Tools Corp, Kenosha, Wis.*

(Continued on page 106)

NALCO has a long record of having aided power plants in 2 ways to increase their steam and power output without adding new equipment:

1. BY MAKING HIGHER OPERATING RATES POSSIBLE AND PRACTICAL. This means protection against carry-over, ability to stand up under higher heat release rates, and production of more steam per B.T.U. of fuel.

2. BY KEEPING BOILERS CONTINUOUSLY CLEAN OVER LONG PERIODS OF TIME. Lower outage requirements have increased net effective boiler plant capacity.

For complete information about the Nalco System, write today. NATIONAL ALUMINATE CORPORATION, 6222 W. 66th Place, Chicago, Ill.

The Nalco System of Feedwater Treatment

Canadian inquiries should be sent to ALUMINATE CHEMICALS LTD., 372 Bay St., Toronto, Ont.

1 VACUUM CLEANER—"Tornado" industrial cleaner said to be noiseless, and weighs about 60 lb. Single-hp motor is direct connected with series of fans giving air displacement of over 175 cfm. Filter area and dust-storage space holds 7½ gal, and can be wheeled away when full. *Breuer Electric Mfg Co, 5100 N Ravenswood Ave, Chicago, Ill.*

2 LAMP-BASE REMOVER—Following shattering of light bulbs in sockets, base remains, and is sometimes difficult to remove. Attachment is inserted into broken base and unscrewed. May be used with current on or off, maker says. Comes in two sizes, for standard or Mogul bases. *Ericson Mfg Co, 5716 Euclid Ave, Cleveland, Ohio.*

3 PIPE VISE—"Ridgid" vise comes complete with 3-legged stand, balanced to prevent tipping and hinged for folding. Tray is wide, providing space for tools, dope pot, etc, and included is pipe rest and three different pipe benders. Equipped with ceiling-brace adjustable screw for holding unit rigid while in use. *Ridge Tool Co, Elyria, Ohio.*

4 ARMOR CUTTER—BX armor cutter is pocket-size tool, with jaws formed to take BX cable of any make, 2- or 3-wire, No. 12 or 14. To use tool, it is only necessary to open jaws, insert BX and snip. Hardened steel blade is removable for sharpening. *Ideal Commutator Dresser Co, 1025 Park Ave, Sycamore, Ill.*

5 VACUUM CLEANER—Premier industrial cleaner has 1-hp motor, and 1-bushel capacity, streamlined for easy portability. All types of cleaning tools available for use with unit. *Electric Vacuum Cleaner Co, Ivanhoe Rd, Cleveland, Ohio.*

6 PIPE AND BOLT THREADER—"71 Series" threads pipe from ⅛ to ¾ in., right or left hand, and bolts from ¼ to 1 in. right or left hand, fine or coarse thread, American or British standard threads. More than 100 sizes of dies available for unit, which comes in ratchet and non-ratchet models. Both models have self-centering chuck with no loose bushings. *Beaver Pipe Tools, Inc, Warren, Ohio.*

7 STAND AND VISE—"Handy Stand" has open vise with capacity ⅛ to 2½-in. pipe, and tool tray and pipe bender with capacity up to 1 in. pipe or conduit. No legs or connecting piece are furnished, but legs can be made from any length pipe operator wishes. *Toledo Pipe Threading Machine Co, 1431 Summit St, Toledo, Ohio.*

RELAY TOOL KIT—Complete kit for setting and maintaining Westinghouse relays consists of steel tool box containing conventional and special tools found useful in maintenance of relays. In addition to complete set of pliers, wrenches, etc, kit contains dental mirror, thickness gage, set of spring adjusters, set of contact and needle files, and cleaning materials. *Westinghouse Electric & Mfg Co, East Pittsburgh, Pa.*

WRENCHES—Drop-forged open-end adjustable wrenches, available in 4-, 6-, 8-, 10-, and 12-in. lengths, with capacities of ½ to 1/16 in. Four tapered threads meshing in forged jaw permit great pressure on handle, says maker. Jaws are designed to fit square or hexagon nuts. *Bonney Forge & Tool Works, Allentown, Pa.*

REPAIR PLUG—"Multi-Seal" repair plug is rivet which can be applied by one man from one side of the work. Consists of special steel bolt surrounded by jacket of ductile metal. Jacket has square head at one end, over which are placed a washer and nut. To use plug, hole is drilled or reamed at place to be plugged. Repair plug is inserted and tightened with two ordinary wrenches. Tightening action first squeezes ductile metal into rivet head inside the hole, second, expands that metal within hole, filling it completely, and third, compresses that metal shoulder against outside of hole, forming a triple-seal. *Rolyan Corp, 2241 Indiana Ave, Chicago, Ill.*

TEST LAMP—SG-100 test lamp requires no fuses for safety, has only one test lead, two parts to handle, and is easily replaced. Can be used on ac or dc circuits from 110 to 600 volts, and is equipped with resistor which limits current to such low value that there is no tripping of relays when checking control panels. Lamp socket is wired above resistor with single test lead wired to side of lamp socket. Resistor and lamp filament are wired in series between test prods, eliminating shorting of resistor. *Sittler Co, 1133 W Van Buren St, Chicago, Ill.*

TORQUE INDICATORS—Used in drawing up a bolt, or a series of bolts, to proper tension, additions to line of wrenches have maximum capacities of 133, 175, 420 and 1000 ft-lb. In smaller sizes Torkflash has flashlight signal showing when desired tension has been reached, and larger sizes have Stay-set dials, which indicate maximum torque reading after tension has been released. *Blackhawk Mfg Co, Milwaukee, Wis.*

INSTRUMENT TEST KIT—Sticht kit contains ammeter, voltmeter and transformer packed in container, entire unit weighing 10 lb. Instruments may be used separately without tying up others. Ammeters have a range of 5 amp, voltmeters are calibrated for 150 and 300 volts, also 150, 300 and 600 volts, and current transformers range from 1 to 250 amp primary; 5 amp secondary. *Herman H Sticht & Co, 27 Park Place, New York, N. Y.*

MIDGET WRENCHES—Designed for speeding up jobs where small nuts and bolts have to be worked on, miniature wrenches have openings of ¼, 9/32, 5/16, and 11/22 in. Each wrench has open end and Boxocket end of same size. *Snap-On Tools Corp, Kenosha, Wis.*

PIPE BENDER—Electrunite bender is for use with "Inch-marked" steel tubes. Is one-piece malleable iron casting with no moving parts to get out of order. Instructions, and markings for making stubs, back-to-back bends and offsets are actually built into side of bender. Standard code radius bends can be made with greater accuracy, says manufacturer. Bending tag included with each bundle of tubes gives complete instruction for use of bender. *Steel & Tubes Div, Republic Steel Corp, Cleveland, Ohio.*

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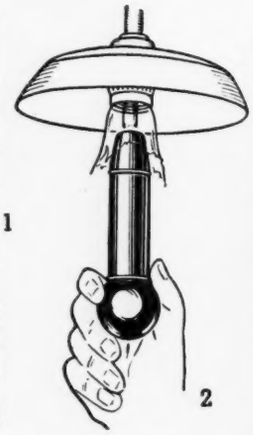

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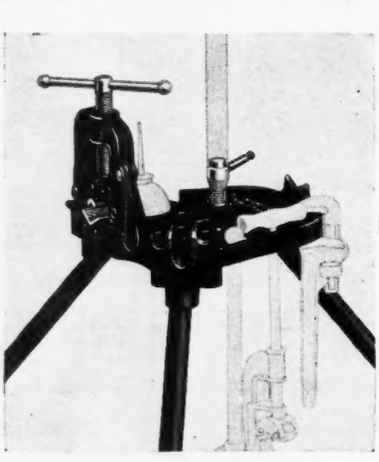

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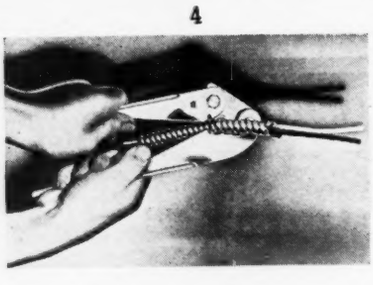

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THREE QUESTIONS...

THREE ANSWERS!

1 **Are You Using Motors that Give Your Machines Best All-Around Performance?**

2 **Are You Protecting Your Production Schedules (and Your Profits) from the Danger of Shutdowns Due to Motor Failures?**

3 **Are You Getting the Long Life and Low Upkeep Expense that Allis-Chalmers Lo-Maintenance Motors Offer You?**

AS A MOTOR USER, do you ask yourself these three vital questions when you select motors for your machines?

If you do, you'll be interested in the case histories shown here . . . three answers to these questions . . . three out of the thousands of users that have acclaimed Allis-Chalmers Lo-Maintenance Motors for their outstanding performance, low maintenance, and long life!

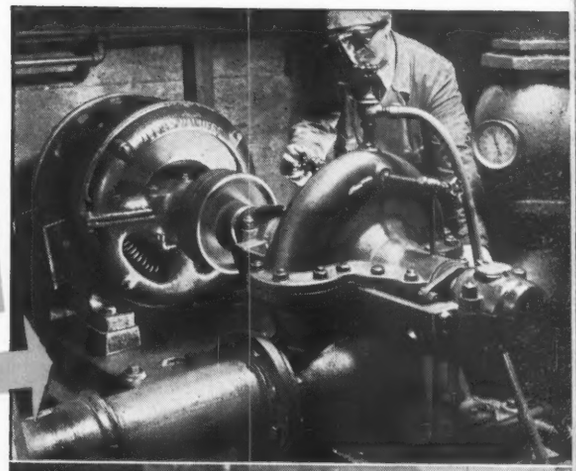
For, in each Lo-Maintenance Motor, you get more than a motor that delivers just a certain rated horsepower. High carbon steel frame . . . indestructible rotor . . . distortionless stator . . . no skimping on materials — these are extra-value features that give you full-measure performance.

To get complete details, see the trained power engineer in the district office near you... or write Allis-Chalmers, Milwaukee . . . today!

A 1257

20 YEARS AT HARD LABOR!

Twenty years on the job . . . 24 hours a day . . . in a spot exposed to heat and moisture . . . with not one cent spent for repairs—that's the day-in and day-out history of this Lo-Maintenance Motor operating in a midwestern brewery.



NO TIME-OUTS FOR REPAIRS!

Operating continuously 24 hours a day . . . this Allis-Chalmers Lo-Maintenance Motor is typical of the 86 that have been seven hard years on the job in this industrial plant with no time-outs for repairs!

25 MOTORS . . . 36 YEARS EACH!

Fighting some of the worst operating conditions any motors could meet—that's what 25 Lo-Maintenance Motors, one of them pictured here, had to do for 36 years in a gas house . . . without running up costly repair bills!

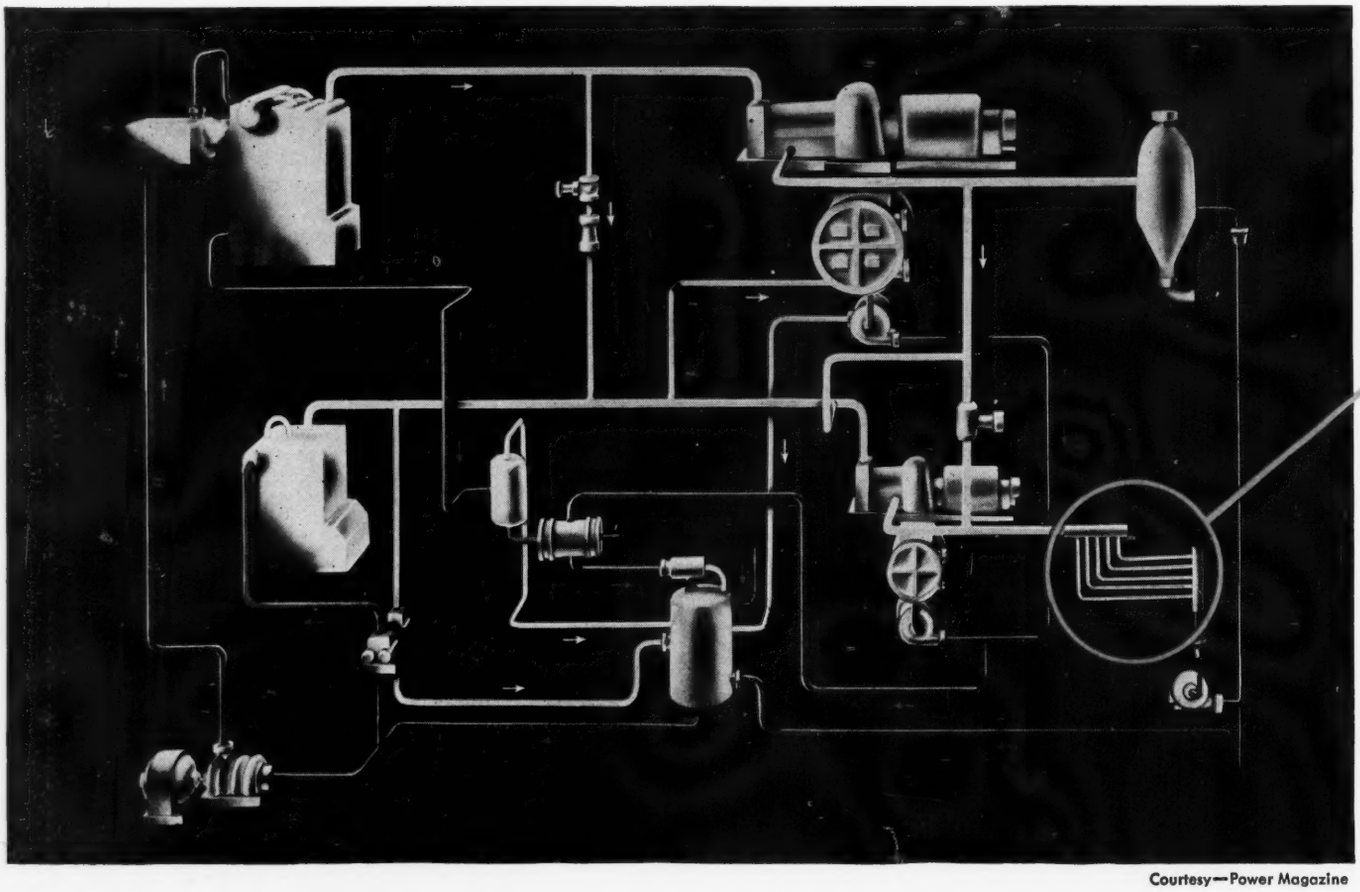
Over 90 Years of Engineering Superiority Work for You When You Specify Allis-Chalmers!

ALLIS-CHALMERS

MILWAUKEE · WISCONSIN

FROM *GOOD* POWER HOOKUPS

FOR VACUUM HEATING SYSTEMS . . .



Courtesy—Power Magazine

HOOKUP #26 **This high-pressure condensing turbine with bleed at former boiler-process pressure illustrates a useful variation of the standard top. Bleed steam supplies existing turbine as well as high-pressure manufacturing process. Vacuum Heating System is fed from bleed point of old turbine supplemented by reducing valve from new-turbine bleed line. Combination of steam- and motor-driven auxiliaries allows flexible supply to open heater.**

IN THE so-called vacuum system of returning condensate from a heating system, a vacuum pump withdraws the air and water from the system, separates air from water and pumps the water back to the boiler—or feedwater heater in the case of the diagram opposite.

Pump is usually controlled by a vacuum regulator and operates in response to a pressure difference between the atmosphere and the return.

The source of steam supply may be a high pressure line through a reducing valve as shown, or direct from a low pressure boiler . . . but in every case, the lowest parts of the supply side of the system are better kept above the water line of the Condensate Receiver to insure adequate drainage of water from the system.

This basic diagram and Reference Chart continues a series of advertisements covering the entire field of "Good Valve Practice" in power plants. The material, we hope, has proved valuable enough for you to keep from month to month—as a guide in the selection and placement of valves for each specific service.

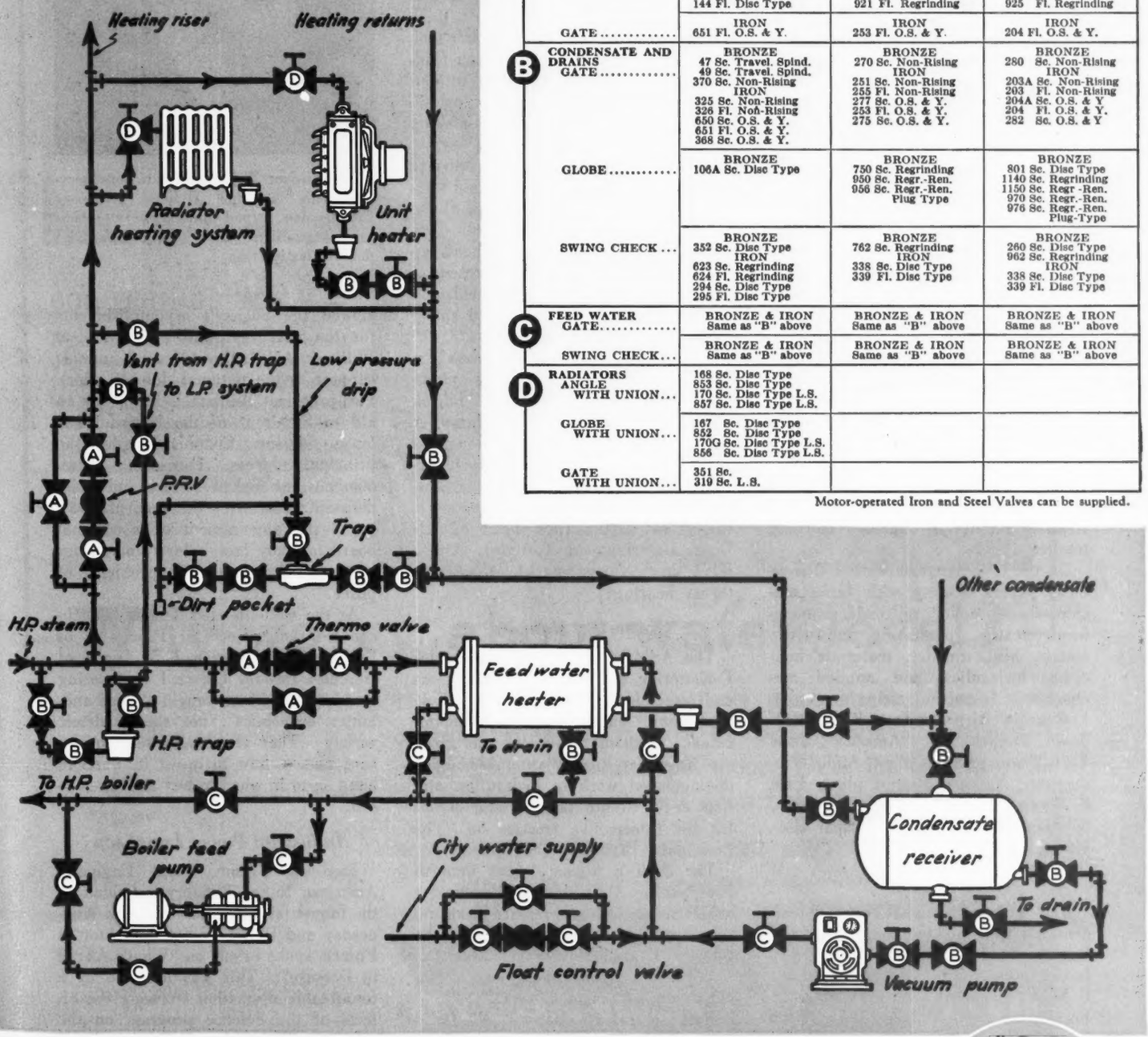
NEXT MONTH—WATER SERVICE SYSTEM

IN VALVES *Jenkins* GIVES YOU EVERYTHING

. . . TO *GOOD* VALVE PRACTICE

Jenkins RECOMMENDS . . .

CONNECTIONS FOR UNITS AND PUMPS



REFERENCE CHART TO JENKINS FIGURE NUMBERS FOR VACUUM HEATING SYSTEMS

		Standard	Medium	Extra Heavy
A	HIGH AND LOW PRESSURE HEADERS GLOBE	IRON 612 Sc. Regrinding 613 Fl. Regrinding 141 Sc. Disc Type 142 Fl. Disc Type	IRON 774 Sc. Disc Type 775 Fl. Disc Type 918 Sc. Regrinding 919 Fl. Regrinding	IRON 162A Sc. Disc Type 162 Fl. Disc Type 922 Sc. Regrinding 923 Fl. Regrinding
	ANGLE	IRON 614 Sc. Regrinding 615 Fl. Regrinding 143 Sc. Disc Type 144 Fl. Disc Type	IRON 776 Sc. Disc Type 777 Fl. Disc Type 920 Sc. Regrinding 921 Fl. Regrinding	IRON 163A Sc. Disc Type 163 Fl. Disc Type 924 Sc. Regrinding 925 Fl. Regrinding
	GATE	IRON 651 Fl. O.S. & Y.	IRON 253 Fl. O.S. & Y.	IRON 204 Fl. O.S. & Y.
B	CONDENSATE AND DRAINS GATE	BRONZE 47 Sc. Travel. Spind. 49 Sc. Travel. Spind. 370 Sc. Non-Rising IRON 325 Sc. Non-Rising 326 Fl. Non-Rising 650 Sc. O.S. & Y. 651 Fl. O.S. & Y. 368 Sc. O.S. & Y.	BRONZE 270 Sc. Non-Rising IRON 251 Sc. Non-Rising 255 Fl. Non-Rising 277 Sc. O.S. & Y. 253 Fl. O.S. & Y. 275 Sc. O.S. & Y.	BRONZE 280 Sc. Non-Rising IRON 203A Sc. Non-Rising 203 Fl. Non-Rising 204A Sc. O.S. & Y 204 Fl. O.S. & Y. 282 Sc. O.S. & Y
	GLOBE	BRONZE 106A Sc. Disc Type	BRONZE 750 Sc. Regrinding 950 Sc. Regr.-Ren. 956 Sc. Regr.-Ren. Plug Type	BRONZE 801 Sc. Disc Type 1140 Sc. Regrinding 1150 Sc. Regr.-Ren. 970 Sc. Regr.-Ren. 976 Sc. Regr.-Ren. Plug-Type
	SWING CHECK	BRONZE 352 Sc. Disc Type IRON 623 Sc. Regrinding 624 Fl. Regrinding 294 Sc. Disc Type 295 Fl. Disc Type	BRONZE 762 Sc. Regrinding IRON 338 Sc. Disc Type 339 Fl. Disc Type	BRONZE 260 Sc. Disc Type 962 Sc. Regrinding IRON 338 Sc. Disc Type 339 Fl. Disc Type
C	FEED WATER GATE	BRONZE & IRON Same as "B" above	BRONZE & IRON Same as "B" above	BRONZE & IRON Same as "B" above
	SWING CHECK	BRONZE & IRON Same as "B" above	BRONZE & IRON Same as "B" above	BRONZE & IRON Same as "B" above
D	RADIATORS ANGLE WITH UNION	168 Sc. Disc Type 853 Sc. Disc Type 170 Sc. Disc Type L.S. 857 Sc. Disc Type L.S.		
	GLOBE WITH UNION	167 Sc. Disc Type 852 Sc. Disc Type 170G Sc. Disc Type L.S. 856 Sc. Disc Type L.S.		
	GATE WITH UNION	351 Sc. 319 Sc. L.S.		

Motor-operated Iron and Steel Valves can be supplied.

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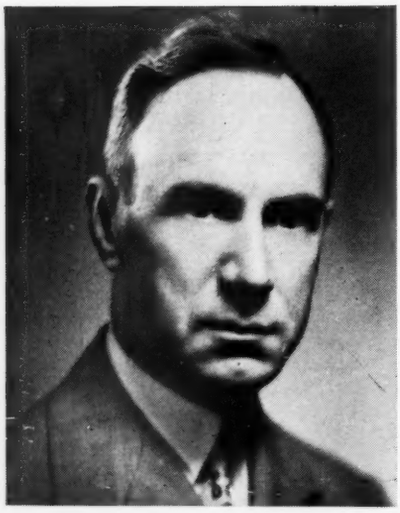
#26 OF A SERIES designed to help in your selection of JENKINS VALVES

ASME Highlights, Awards



William A Hanley, President-Elect, is Director and Head of Engineering Division of Eli Lilly & Co., Indianapolis. He pledged "all-out" cooperation with national defense efforts

▶ BIGGER IN REGISTRATION than last year's successful annual meeting in Philadelphia, the 61st Annual Meeting of the American Society of Mechanical Engineers was back again in the headquarters city of New York during the week of December 2 to 6—not, however, in the Engineering Societies Building on 39th St, but at the Hotel Astor on Broadway's Times Square. Registration up to Thursday morning totalled 2281.

On the 1940 program were 100 technical papers dealing with fuels, machine-shop practice, railroads, management, textile, processing industries, metals, heat transfer, materials handling, hydraulics, and applied mechanics. Inspection trips took in LaGuardia Airport, East River Mid-Town Tunnel, S.S. "America", *New York Times* printing plant, Audio Productions, National Biscuit plant, Yale & Towne plant (Stamford, Conn.), diesel-engine plant of Mt. Sinai Hospital.

New Officers

New officers installed were: *president*, William A Hanley, (Head of the Engineering Division of Eli Lilly & Co, Indianapolis); *vice-presidents*: Samuel B Earle (Dean of Clemson College); Frank H Prouty (Industrial Appraiser Commission, Denver); E B Ricketts, (Mechanical Engineer, Consolidated Edison Co, New York); *Managers*: Huber O Croft (Head of ME Dept., University of Iowa); Paul B Eaton (Head of ME, Lafayette College); George E Hulse (Engineer, Safety Car Heating and Lighting Co, New Haven, Conn.).

Social Events

Notable social events were the Stag Smoker on Tuesday night, and the "Honors Night" events of Wednesday. Both filled to capacity the main ball room of the Astor—more than a thousand for each event. The Smoker took the form of a "circus", in which leading engineers were drafted without notice to cooperate with the professional talent in various fun-making stunts.

Following the pattern of previous years, Honors Night did multiple duty as the outstanding formal event of the week. Members and their ladies enjoyed a fine dinner. The new honorary members and medalists were presented, the president's reception was held, and those who wished to dance had ample opportunity.

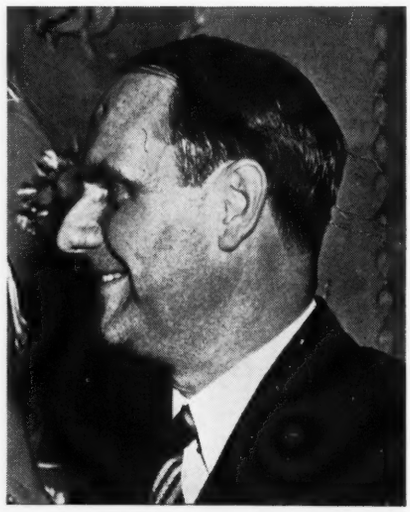
The five new honorary members were: William L Abbott (chief operating engineer, Commonwealth Edison Co, Chicago, 1899 to 1936), James A Seymour (inventor and developer of the McIntosh & Seymour engine), Arthur M Greene, Jr. (Dean Emeritus, College of Engineering, Princeton), Robert W Angus (first head of ME Dept, University of Toronto), Albert Kingsbury (inventor of Kingsbury thrust bearing).

Kettering Honored

The ASME Medal went to Charles F Kettering for outstanding inventions and research; the Holly Medal to E H Armstrong, leader in radio communication. William B Gregory was given the Worcester Reed Warner Medal for distinguished work in hydraulics, and Carl A W Brandt the Melville Medal for his informative treatise on "The Locomotive Boiler".

The Pi Tau Sigma Award went to Prof George A Hawkins of Purdue for achievements in high-pressure steam research and engineering education; the Charles T Main Award to Frank DePould for a paper on automatic synchronizing of prime movers.

Past president Harvey N Davis (president of Stevens Institute) was toastmaster. Retiring president Warren H McBryde of San Francisco reviewed the Society's accomplishments for the past year and president-elect William A Hanley pledged utmost support to the national defense effort. Past-president William L Batt, now an aid to Stettinius of the National Defense Advisory Commision gave the principal address. Foreseeing a tremendous national problem in industrial demobilization after the war, Mr Batt urged the appointment of a national board to study how industry may later be regeared to meet the problems of peace.



Past-President William L Batt, now serving with National Defense Advisory Commission, urged immediate attention to the problems of post-war industrial demobilization

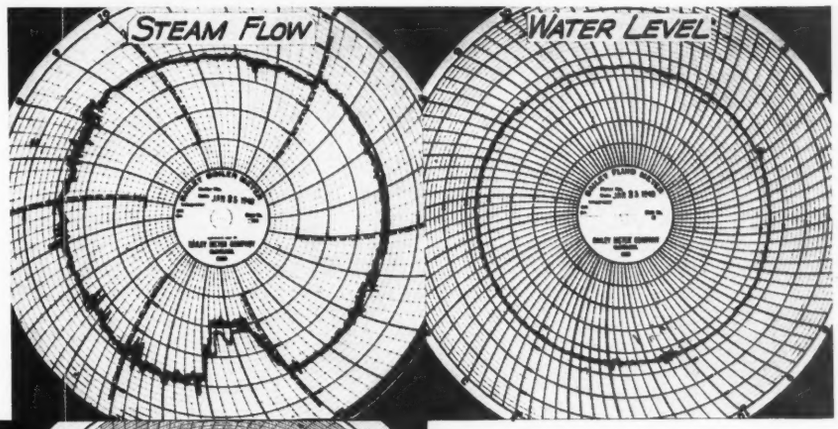
At the well-attended Tuesday luncheon for the Society for Promotion of Engineering Education, K W Jappe, of Hercules Powder Co, said engineering students should be taught "bread-and-butter economics", not the academic variety. They should be told how to earn money, how to invest it, when to hang on to it, when to buy and when to sell.

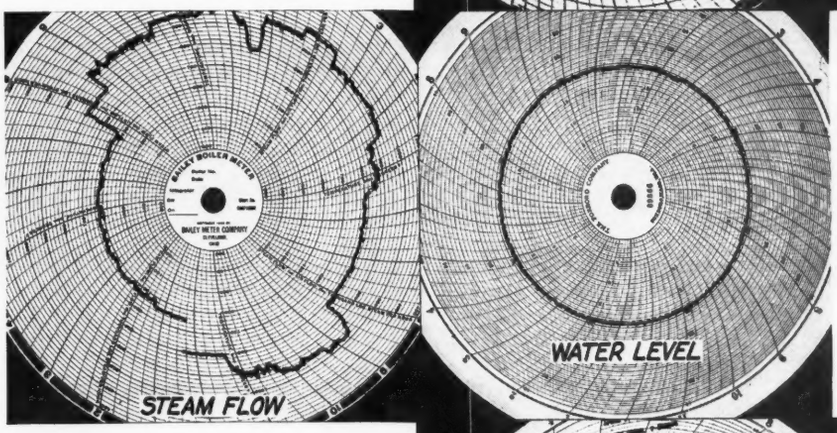
Industrial Power Luncheon

Fred M Gibson, Plant Engineer, American Sugar Refinery, presided at the Industrial Power Luncheon on Wednesday and Philip W Swain, Editor of POWER, spoke briefly on "What's Ahead in Defense". This was followed by a round-table discussion stressing the effects of the defense program on the supply, price and deliveries of fuel and various types and sizes of power equipment.

1300 POUNDS W.S.P.—

Fired with pulverized coal or oil, this 1300-pound B. & W. boiler in a prominent Eastern utility plant normally evaporates 275,000 pounds per hour with a maximum of 300,000 pounds. Excess water pressure at pump discharge is 250-300 pounds. The boiler water level is held within plus or minus one inch of the desired normal by the COPES Flowmatic Regulator.



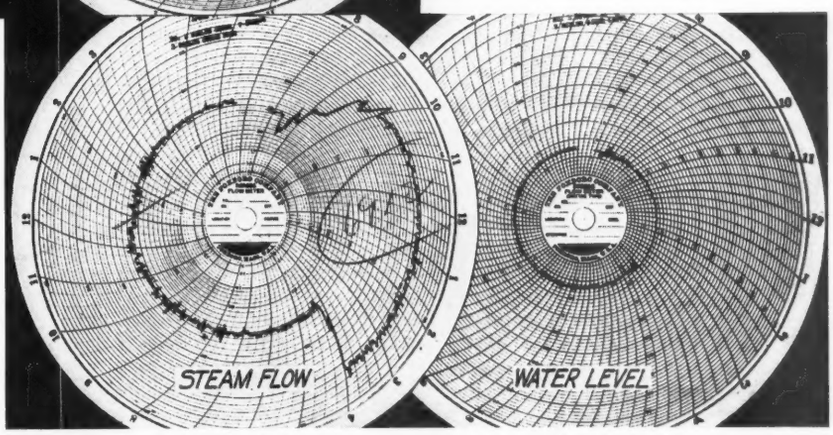


—875 POUNDS W.S.P.

Powdered coal firing. 875-pound, 860-degree, Foster Wheeler 3-drum boiler. The maximum evaporation with this utility boiler is 400,000 pounds per hour; normal, 330,000 pounds per hour. The motor-driven centrifugal pump has no automatic pressure control. Extreme water level range permitted by COPES Flowmatic is 1.6 inches.

600 POUNDS W.S.P.—

Firing with acid sludge or gas, normal evaporation is as high as 350,000 pounds per hour on this 600-pound pressure Riley Steam Generator. Boiler water level is carried one inch higher at peak load of 360,000 pounds per hour than at normal minimum of 242,000 pounds per hour. The level control by COPES Flowmatic is unusually close on all loads.



Why worry about water level?

The COPES Flowmatic is daily demonstrating close level control at pressures from 80 to 1325 pounds—for capacities up to 550,000 pounds per hour. Write for Bulletin 429, showing typical charts and explaining operation.

NORTHERN EQUIPMENT CO., 2201 GROVE DRIVE, ERIE, PA.

Feed Water Regulators, Pump Governors, Differential Valves
Liquid Level Controls, Reducing Valves and Desuperheaters

★ GET CLOSER LEVEL CONTROL WITH THE COPES FLOWMATIC ★ REGULATOR

It Is More Blessed to Give . . .

THE HISTORY OF OUR EARTH is dominantly a history of conquerors, of Caesar, Attila, Alexander, Napoleon, Xerxes, Genghiz Khan, Tamerlane, and the like—men who conquered their worlds. Their names bulk large in the history books. But other names, the names of those who conquered themselves, are in the hearts of the people. Joan of Arc, William Tell, Robin Hood, St Augustine, King Arthur, St Valentine, St Nicholas—each of these is a legend, a fabric of folk tales built upon the hopes and wishes of all of us.

Conquerors would, if they could, stamp out these legends, for, among all the conquerors, there is not one whom men want to remember, not one about whom they want to sing or spin rhymes, not one whose *birth* date they wish to celebrate.

But on Christmas Eve, our children recall to us again another story—the story of the man named Nicholas who became a saint. He was a rich man who devoted his life to seeking out and giving secretly to the needy. To them he was a God-sent gift on the doorstep, a benevolent spirit who helped them when they were in desperate need.

It is only fitting that his memory should be cherished by innocent children, whether they call him St Nicholas, Father Christmas, Knecht Clobes, Bonhomme Noël, or the much more familiar Santa Claus. Kindly, benevolently, he comes once a year to reward the worthy with gifts, to build in the hearts of little children the belief in the Golden Rule.

Perhaps this is the core of our grown-up weaknesses—that as we grow older we cease to believe, first in the physical Santa Claus, then in the idea of Santa Claus, and finally even in the spirit of Santa Claus. We substitute for the thought of *giving* the thought of *getting*. We base the placing and size of our gifts on the expected return.

This spirit of "get" dominates all of us too often and too long—in our personal lives, our business lives, and our national lives. It seems only reasonable to expect that, just once each year, on the anniversary of Jesus' birthday morn, we may again have the faith of a little child. Can't we recapture, if only for that one fleeting day, the real and transcending belief that there *is* a spirit of Santa Claus, and do, each of us, our own little bit toward making that belief real to our fellow men? It is little enough to hope for—and worthy of our greatest hopes.

George Edwards
Engineer

May the spirit of Christmas make glad your heart this, and every other year

FLOW CONTROL FOR 1941 POWER LOADS

Above: Crane 1500-pound Alloy Cast Steel Globe and Angle Valves for steam and water. Crane plug-type disc and seat resist severest conditions of throttling service—give positive flow regulation—assure tight closure. Sizes: 2 to 6″; full range of seating metals. Flanged and butt-welding ends.

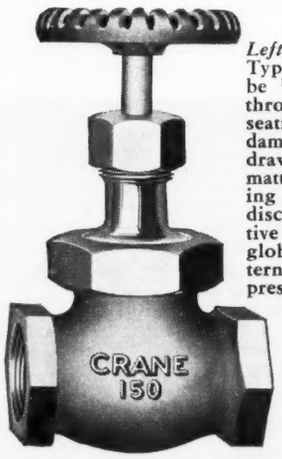
● 1941 threatens abnormal working conditions for power piping. If you are at all unsure of any flow-control equipment in your plant, it's wise to apply Preventive Maintenance now. You will have less time for trouble later.

For every point in your piping, there are Crane valves and fittings with specific adaptability to service needs—under "1941 working conditions." The superior design and materials—the great reserve stamina of Crane-Equipment assure sustained flow-control efficiency despite prolonged stresses and strains.

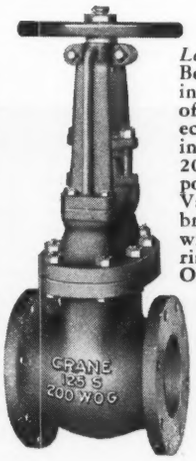
It's your Crane Man's job to help you get most for piping maintenance dollars. Not only is he the source of dependable valves and fittings for every need, but also of accurate information on their proper usage. He's at your service!

CRANE PIPE FABRICATING SERVICE

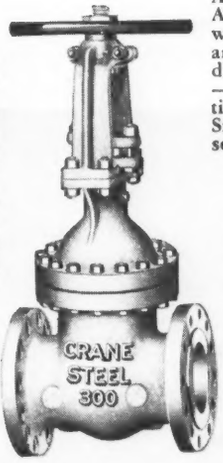
No matter what you need in power plant piping, you can get it from the vast Crane pipe-shaping and fabricating shops. Experience, modern shop methods, and rigid standards of quality guard your satisfaction on every job—from simple cutting, threading, welding, to the most complex bends, headers, assemblies.



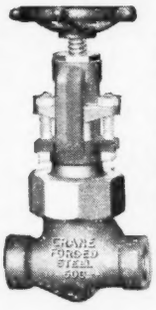
Left: Crane Brass Plug-Type Disc Valves can't be beat in any tough throttling jobs. Wide seating surfaces repel damaging effects of wire drawing and foreign matter; assure long-lasting tightness. Tapered disc provides easy, positive flow regulation. In globe and angle patterns up to 350 pounds pressures. Sizes: 1 to 4″.



Left: Crane Standard Iron Body Wedge Gate Valves in all-iron or wide variety of trim metals, provide economical flow control in many services up to 200 pounds W.O.G., 125 pounds steam pressure. Valves for steam have brass seats and stem—with screwed-in body seat rings. Non-rising stem, O.S.&Y. types; 2 to 48″.

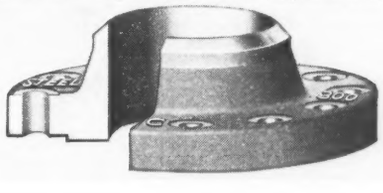


Left: 300-pound Crane Alloy Cast Steel Wedge Gate Valves. Long, close-fitting guides accurately seat disc with minimum wear. T-head disc-stem connection prevents lateral strains on stem. Sizes: 1¼ to 24″; full range of seating metals. Screwed, flanged, butt-welding ends.



Left: Crane Small Steel Valves are widely noted for *"tailor-made"* adaptability to high pressure-temperature working conditions in any service. From hand-wheel to ends they embody all finest valve engineering improvements. Rated at 600 pounds, 750° F. Gates, globes, angles, checks—in 8 sizes up to 2″—screwed, flanged, or socket weld ends.

Crane Welding Fittings are as strong as the pipe itself. Insides of bends and elbows are truly circular and of full diameter. Welding Flanges are forged from steel having greatest strength—temperature, shock, strain resistance—easy weldability. All welding ends are machine beveled. In a wide range of sizes for all pressures and temperatures.



1940 OUR 85th YEAR

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VALVES • FITTINGS • PIPE
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NATION-WIDE SERVICE THROUGH BRANCHES AND WHOLESALERS IN ALL MARKETS

NEW CATALOGS, BOOKLETS, BULLETINS

For Your Convenience—Copies of the literature described on this and following pages may be obtained by filling out the business-reply cards on page 127

Over 400 items have been described, covering practically all equipment and supplies used by power engineers. So don't get worried if your requests fail to come back to you by return mail, because it will take two or three weeks at least to sort and classify the return cards. We have made our New Year's resolution in advance to get literature to you as quickly as possible

AIR-CONDITIONING EQUIPMENT

1 AIR WASHERS—Bayley Blower Co, 1817 S 6th St, Milwaukee, Wis. Illustrated Bulletin 34-A goes into air-washing problems and their solution, describes Bayley turbo air washer, and presents installation and operation data. Also includes 16-in. wide psychrometric chart.

2 AIR WASHERS—Buffalo Forge Co, Buffalo, N. Y. Bulletin 3142-A covers Buffalo air washers, describes various types, presents construction and operating details. Includes general specifications and dimensions.

3 AIR CONDITIONING—Carrier Corp, S Geddes St, Syracuse, N. Y. Bulletin No. AC-129 describes Carrier equipment used in air conditioning, refrigeration and unit heating. Photos illustrate equipment; tables and charts give ratings and dimensions.

4 UNIT COOLERS—Fedders Mfg Co, Inc, Buffalo, N. Y. Condensed catalog No. AC-300 gives specifications, dimensions and performance data on Fedders' unit coolers for comfort cooling. Refrigerant and cold-water ratings for standard conditions and conversion factors for varying conditions included.

5 ODOR ADSORBERS—Dorex Div, W B Connor Engrg Corp, 114 E 32nd St, New York, N. Y. 8-page bulletin No. 105 covers entire line of odor adsorbers for air conditioning and industrial odor control. List of users included, and principle of operation explained.

6 AIR CONDITIONING—National Association of Fan Manufacturers, General Motors Bldg, Detroit, Mich. 16-page booklet entitled "The Magic of Fresh Air and Electricity," shows application of ventilating equipment for industry, commercial houses, and the home.

BEARINGS

7 BEARINGS—Neveroil Bearing Co, Wakefield, Mass. Catalog 11 covers "Neroil" oilless and self-lubricating bearings and bushings. Types include "Graphex", graphited metal; "Woodex", impregnated wood; and "Coprex", special bronze. Includes data on operation, rating tables and installation.

8 BEARINGS—SKF Industries Inc, Philadelphia, Pa. 36-page catalog, "SKF Spherical Roller Bearings", illustrates roller-bearing applications and contains information on bearing selection, time-saving computations, and drawings of various types of roller-bearing design.

9 BEARINGS—New Departure Div, General Motors Corp, Bristol, Conn. Bulletin F-15 is addition to holders of ring-binders and deals with application of ball bearings to crankshaft of small air-cooled single-cylinder engines.

10 ROLLER BEARINGS—Shafer Roller Bearing Corp, 35 E Wacker Drive, Chicago, Ill. 86-page catalog No. 15 describes and illustrates Shafer line, with photographs, life-expectancy tables, speed factors, formulas and examples, and other engineering data.

11 BEARINGS—Johnson Bronze Co, New Castle, Pa. 22-page catalog L-2 covers new size listing of Ledaloyl self-lubricated bearings. Includes listings for more than 850 stock sizes, and sizes, part numbers, prices, technical and application data for the separate sizes.

12 BEARING ALLOYS—Lumen Bearing Co, Buffalo, N. Y. 70-page book is supplement to Lumen handbook, and details physical and metallurgical properties of latest non-ferrous bearing alloys developed by company.

BELTING

13 V-BELTS—B F Goodrich Co, Akron, Ohio. 170-page "V-Belt Data Book" gives alphabetical list of belt requirements for small equipment such as refrigerators, washing machines, pumps, stokers, oil burners, air compressors, buffing machines, etc. Listings give manufacturer's part number, Goodrich belt number and size in each case.

14 V-BELT DRIVES—L H Gilmer Co, Tacony, Philadelphia, Pa. 96-page catalog "Guide to Efficient V-Belt Practice" contains new horsepower ratings for multiple belts, and has section on sheave information covering flat pulleys for V-to-Flat drives, and adjustable diameter and companion sheaves.

15 LEATHER BELTING — Chicago Belting Co, 113 North Green Street, Chicago, Ill. 24-page spiral-bound catalog covers all brands of leather belting made by company and gives numerous applications, prices and specifications.

16 LEATHER BELTING—J E Rhoads & Sons, 35 N 6th St, Philadelphia, Pa. 30-page booklet, prepared as an aid to solution of belting problems, contains practical information on belting, what to do if something isn't operating properly, and data sheets for ordering drives.

17 V-BELT DATA—B F Goodrich Co, Akron, Ohio. 24-page catalog section explains in non-technical terms, problems of selecting a V-drive using stock belts, and how to follow the problems step-by-step. Includes discussion of V-Belt practice.

18 V-BELTS—Medart Co, 3538 DeKalb St, St. Louis, Mo. Bulletin 117-G shows new belt ratings of Medart V-Belts, and gives simple method of figuring correct belt and sheave combination from data shown.

19 MECHANICAL RUBBER GOODS—B F Goodrich Co, Akron, Ohio. 24-page catalog has engineering data and guide to selection of various mechanical rubber goods made by company. Data includes tables on minimum pulley diameters, transmission belting horsepower, simple method for correcting hp ratings, and discussion on selection of proper type and grade of belt.

20 V-BELTS—Allis-Chalmers Mfg Co, Milwaukee, Wis. Revised catalog

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2 NOTEWORTHY ARRIVALS

At North Beach Airport

Two 36" x 72" Everdur storage water heaters fabricated by Quaker City Iron Works, Philadelphia, Pa., for North Beach Airport, N. Y.

The moment these two Everdur Tanks landed at the world's largest airport, tank-rust was forestalled for keeps!

EVERDUR, The American Brass Company's copper-silicon alloy, is permanently rustproof. From tanks of this metal, rust-free water will flow indefinitely.

In terms of dollars and cents, this means that once an Everdur heater is installed, there will never be another expenditure for replacement or repairs due to rust. What's more, Everdur is a moderately priced metal. It can be readily welded by both the gas and electric processes and further fabricated by all standard construction methods. The names of companies regularly producing Everdur equipment will be sent you on request, together with detailed information about this high-strength, multi-purpose copper-silicon alloy. 4058

Everdur TANK METAL ANACONDA from mine to consumer

THE AMERICAN BRASS COMPANY, General Offices: Waterbury, Connecticut
In Canada: Anaconda American Brass Ltd., New Toronto, Ont. • Subsidiary of Anaconda Copper Mining Co.

[EVERDUR is a trademark of The American Brass Company registered in the United States Patent Office.]

section No. 151 introduces new horsepower ratings for multiple-V-belt drives based on formula developed by Robert F Vogt. Also provides engineering information on selection of size for horsepower ratings, speed, center distance and sheave diameters.

21 BELT FASTENERS—Flexible Steel Lacing Co, 4607 Lexington St, Chicago, Ill. 4-page booklet describes Flexco belt fasteners, showing method of application to belts and various tools needed to install fasteners.

22 LEATHER PRODUCTS—Graton & Knight Co, Worcester, Mass. 44-page catalog is divided into three sections. First contains data on research leather belting, Heart Oak flat belting, round belting, belt installation and maintenance, and how to select the proper belt. Second part is devoted to leather for packing, custom-built packings, valve leathers, and oil mill and gin-press crimps. Third section covers textile leathers for looms, condensers, combs, etc.

23 TEXROPE DRIVES—Allis-Chalmers Mfg Co, Milwaukee, Wis. Bulletin B-6051-A contains information on Texrope drives, Texrope belts, Texsteel, Texdrive and regular cast-iron sheaves. Dimensions, horsepowers and speed-range tables are shown for eleven sizes of Vari-pitch speed changers.

24 BELTING CALCULATOR—J E Rhoads & Sons, 35 N 6th St, Philadelphia, Pa. Slide-rule type calculator enables user to calculate belt speed, if diameter of pulley and rpm are given; figures hp per in. of belt width over type of belt; figures belt width when hp is determined.

25 BELTING—Hewitt Rubber Corp, Buffalo, N. Y. 4-page booklet describes numerous types of Hewitt transmission belts, giving uses of each, and showing a sample of each in pictures.

26 LEATHER BELTING—J E Rhoads & Sons, 35 N 6th St, Philadelphia, Pa. 4-page leafleat sums up advantages of Tannate Watershed leather belting. Several applications included.

BLOWERS

27 ROTARY BLOWERS—Roots-Connersville Blower Corp, Connersville, Ind. Bulletin 21-B-35 describes new operating principle of Victor-Acme, 2-impeller, positive-displacement blower. Contains table of ratings of the several different sizes, also illustrations of numerous arrangements and applications.

28 BLOWER WHEELS—Advance Aluminum Castings Corp, 2742 West 36th Place, Chicago, Ill. 80-page catalog illustrates and describes complete line of "Castalu" fan wheels, with performance charts and tables showing capacities of different size fans at various speeds and static pressures. Feature is scroll layout which can be used to lay out housing for any size fan.

BOILERS

29 BOILERS—Union Boiler & Mfg Co, Lebanon, Pa. 4-page pamphlet describes new "Frederick" steam-generating unit in standard sizes from 6500 to 25,000 lb steam per hr. Illustrations show features incorporated in this design.

30 BOILERS—Babcock & Wilcox Co, 85 Liberty St, New York, N. Y. Bulletin No. G-28 describes Design 32 cross-drum, straight-tube, sectional header unit for pressures of 250 lb or less, with heating surface from 1000 to 6000 sq ft.

BOILER ACCESSORIES

31 BOILER BAFFLE WALLS—The Engineer Co, 75 West St, New York, N. Y. Bulletin BW-40, 8-pages, 2-colors, covers modern practice in baffle design and construction. Well illustrated by line drawings and cross-sections.

32 OIL BURNERS—The Engineer Co, 75 West St, New York, N. Y. 4-page bulletin describes Enco fuel-oil burning, pumping and heating systems for power-plant and industrial-process installations. Gives specifications and detailed drawings.

33 CRUSHERS—American Pulverizer Co, 1249 Macklind Ave, St. Louis, Mo. 8-page bulletin describes "Rolling Ring" and swing hammer crushers, together with grinders and shredders for the laboratory. Line drawings presented.

34 BOILER-FEED & CONDENSATE-RECOVERY SYSTEMS — Fred H Schaub Engineering Co, 325 W Huron St, Chicago, Ill. 24-page illustrated catalog 640 gives complete information on line of boiler-feed and condensate-recovery systems and the line of "Magnetrol" liquid-level controls. Includes specifications and installation data.

35 CONTINUOUS BLOWDOWN SYSTEM—Elgin Softener Corp, 55 North Street, Elgin, Ill. Bulletin 510 presents a treatise on continuous-blowdown systems for steam boilers. Typical plant studies accompanied by charts and tables illustrate the advantages secured and the need for such systems to obtain adequate control of boiler-water concentration. Heat exchangers are also discussed with emphasis on their savings and proper location.

36 BOILER-FEED SYSTEMS—Micro-Westco, Inc, Bettendorf, Iowa. 4-page folder illustrates and describes Westco automatic boiler-feed systems, in sizes up to 25 hp and 125 lb pressure. Accessory equipment for boiler systems also listed.

37 DEAERATING HEATER — Permutit Co, 330 West 42nd St, New York, N. Y. Bulletin No. 2357 briefly describes history of development of deaerating heaters, presents causes of corrosion of boilers and piping, and methods for preventing such corrosion.

38 DESUPERHEATERS — Bailey Meter Co, 1036 Ivanhoe Road, Cleveland, Ohio. Pressure-reducing and desuperheating control of air-operated type is illustrated and explained in bulletin No. 107-A. Includes diagrammatic arrangements, installation photographs and photos of individual control units.

39 FURNACES—Babcock & Wilcox Co, 85 Liberty St, New York, N. Y. 32-page bulletin G-16 discusses water cooling for boiler furnaces, describes and illustrates details of B & W water-cooled furnace constructions.

40 COAL—Chesapeake & Ohio Lines, Coal Traffic Dept, Cleveland, Ohio. 24-page booklet, "The Coal Bin of America," presents the story of coal from the beginning, starting with its formation and following through, showing its uses and effects it has had upon man and industry. Describes C & O service for handling coal from mine to power plant.

41 SPUN HEADS—Lukens Steel Co, Coatesville, Pa. Board-bound, 132-page catalog covers various types of spun heads for boilers and other pressure vessels. Numerous code specifications included, and other engineering data given.

42 AIR PREHEATER—Air Preheater Corp, 60 E 42nd St, New York, N. Y. 20-page booklet describes Ljungstrom air preheater, illustrating unit, and showing by cross-section drawings applications in plant.

43 BOILER ACCESSORIES—Steel Improvement & Forge Co, Cleveland, Ohio. "Boiler and Tank Accessories" presents complete line of Diamond-S accessories for boilers and tanks. Includes descriptions of welding fittings, forged flanges, manhole covers, etc.

44 STEAM SCRUBBER—Bradshaw & Co, 530 Fourth Ave, Pittsburgh, Pa. 8-page bulletin describes W-K-M master steam scrubber. Purposes of scrubber are given, design presented, and questions and answers are asked and answered concerning operation and capacities of scrubber.

45 COAL PULVERIZERS — Whiting Corp, Harvey, Ill. 16-page bulletin No. 199 describes Whiting pulverizers, and tells how use of pulverizers will lower steam costs. Specifications, method of operation, and table of standard dimensions included.

46 CONDENSATE RETURN — Roots-Connersville Blower Corp, Connersville, Ind. Bulletin 260-B14C, with price list Form L14E, covers complete line of automatic condensate-return units for vented gravity systems.

CABLE, WIRE & FUSES

47 WIRE & CABLE—John A Roebling's Sons Co, Trenton, N. J. Booklet "Roebling Rubber - Covered Wires and Cables—Service Entrance Cables" presents latest information in photos and rating tables. 11 pages of useful data for the electrical engineer include tables on current-carrying capacities, minimum conductor sizes, areas and dimension, etc.

48 WIRE & CABLE DATA—Simplex Wire & Cable Co, 79 Sidney St, Cambridge, Mass. Simplex Manual contains data and tables for electrical engineers, contractors, wiremen, and other engineers. Includes descriptions of Simplex products, and such tables showing current carrying capacities of various wires, cable engineering data and miscellaneous mathematical tables. 270 pages.

49 FUSES—Ware Brothers, 4500 W Lake St, Chicago, Ill. 8-page folder lists, illustrates and prices all types of Ware renewable, "Hi-lag" fuses. Advantages presented, together with ratings in amps and volts for each fuse.

50 CONNECTORS—Burndy Engrg Co, Inc, 459 East 133rd St, New York, N. Y. 15-page booklet entitled, "Electrical Connectors Guide", is series of charts making simple the task of selecting proper connectors for given condition. Also gives brief advantages of various types of connectors.

51 INSULATED CABLE — General Electric Co, Schenectady, N. Y. 4-page bulletin No. GEA-2733D describes Flamenol insulated cable, giving conductors per conduit, and other general dimensions. Numerous typical applications of cable listed and illustrated.

52 CONNECTORS—Burndy Engrg Co, 459 East 133rd St, New York, N. Y. Catalog No. 41 contains additional complete engineering data on electrical contactors. Photographs of unusual installation included.

CLUTCHES & COUPLINGS

53 FLEXIBLE COUPLINGS—Charles Bond Co, 623 Arch St, Philadelphia. 12-page booklet No. WF-16 covers 5 different types of flexible couplings made by company. Descriptions of each type included, and photographs, dimensions and price lists given.

54 FLEXIBLE COUPLINGS—Farrel-Birmingham Co, Inc, Ansonia, Conn. 44-page catalog No. 443 explains the function of flexible couplings, and tells how Gearflex units compensate for misalignment in different shafts. Covers applications and includes ratings, and weights.

55 FLEXIBLE COUPLINGS — Link-Belt Co, 307 N Michigan Ave, Chicago, Ill. 12-page catalog No. 1845 contains complete price and dimensional data on Types A, B and RC couplings, together with information on revolving and stationary casings for the RC type. Simple selection tables and instructions for installation and lubrication included.

56 FRICTION CLUTCH — Carlyle Johnson Machine Co, Manchester, Conn. 10-page bulletin contains revised data covering Johnson standard friction clutch, as well as Super-Johnson expanding-ring friction clutch.

57 COUPLINGS—Ajax Flexible Coupling Co, Westfield, N. Y. 20-page data book gives complete tabulated data on horsepower and torque ratings as well as dimensional specifications on complete line of forged-steel and cast-iron couplings, including conventional and shear-pin types.

COMBUSTION & OTHER CONTROL

58 COMBUSTION CONTROL—Brooke Engineering Co, Inc, 4517 Wayne Ave, Philadelphia, Pa. 8-page bulletin 10 presents operation, layout and results from electric-eye system of automatic combustion control. Photos and diagrams show hookups.

59 PRESSURE-REDUCING REGULATORS—Foster Engrg Co, 109 Monroe St, Newark, N. J. Catalog 70, bulletin 10, covers pressure-reducing regulators for steam, hot liquids and hot gases for initial pressures up to 2500 lb, delivery pressures to 1200 lb, and temperatures up to 1000 F. Well illustrated with photos, cutaway drawings, tables.

60 AUTOMATIC CONTROL—Askania Regulator Co, 1603 S Michigan Ave, Chicago, Ill. 12-page picture booklet, "Evidence", shows by installation photos how Askania jet-pipe regulator is being used to control furnaces in iron and steel industry, in power plants,

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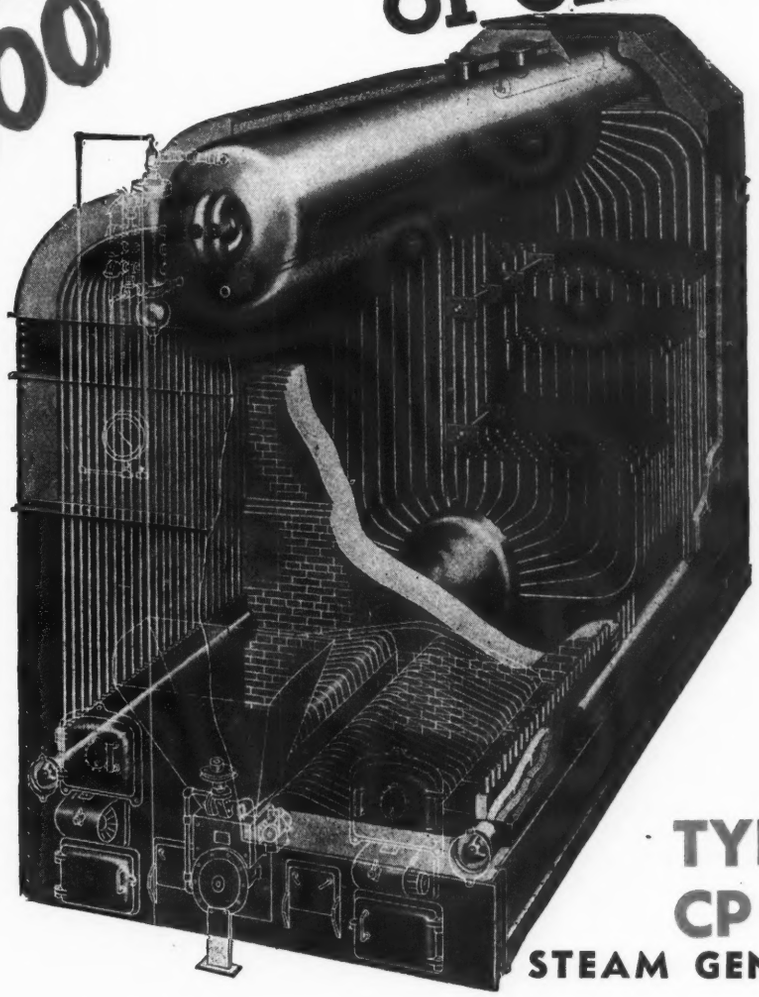

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glass-melting tanks and process plants. Bulletin 100.

61 CONTROLLERS—Struthers Dunn, Inc, 1315 Cherry St, Philadelphia, Pa. 32-page catalog contains information on relays, timing devices, and thermostats.

62 CONTROLS—Mercoid Corp, Belmont Ave, Chicago, Ill. 58-page catalog covers all controls made by company, giving a photograph of some and brief descriptions of each. Federal warranted gages are also briefly described.

63 HEAT-CONTROL SYSTEM—Armstrong Heat Control Corp, 1307 N E Eleventh Ave, Portland, Ore. 8-page bulletin describes Armstrong heat control system, tells what it is and what it does. Shows numerous installations, giving approximate savings effected by use of system.

64 CONTROLS — Automatic Control Co, 1005 University Ave, St. Paul, Minn. 32-page catalog C-3 lists all types of controls made by company. Includes descriptions of Tanktrols. Floatrols, automatic alternators, float switches, Selectrols, Duotrols, and numerous accessories.

65 LIQUID-LEVEL CONTROL — Fred H Schaub Engrg Co, 325 W Huron St, Chicago, Ill. 4-page booklet No. 140 describes "Magnetrol" liquid-level-control system, which provides 5-point control including low-water cut-off, high-water cut-off, low-water alarm and high-water alarm.

66 CONTROLS — Automatic Control Co, University Ave, St. Paul, Minn, File-folder-type perpetual catalog contains description and photos of all types of controls made by company. Other bulletins will be sent to keep file up to date.

67 COMBUSTION CONTROL—Republic Flow Meters Co, Chicago, Ill. 88-page data book No. S-21 covers automatic combustion control for all sizes and types of boiler, all types of fuel firing and all load conditions. Data is made up of literature concerning actual installations, giving operating data on Republic-Smoot units.

68 LIQUID-LEVEL CONTROLLER—Cochrane Corp, 17th & Allegheny Ave, Philadelphia, Pa. Publication 2939 contains descriptions of five different methods of liquid-level control. Operation and advantages of each type explained.

COMPRESSORS & ACCESSORIES

69 COMPRESSORS, PUMPS, AMMONIA-GAS BOOSTERS — Yeomans Brothers Co, 1433 N Dayton St, Chicago, Ill. Bulletin 7201, well illustrated, gives complete information on construction details, installation procedure, operation and lubrication, for rotary compressors, dry vacuum pumps, and ammonia-gas boosters.

70 AIR COMPRESSORS — Chicago Pneumatic Tool Co, 6 East 44th St, New York, N. Y. Bulletin 726 (in 2 colors and well illustrated) presents improvements in several details of construction of CP 2-stage compressors in capacities of 350 to 10,000 cfm for pressures of 80 to 125 lb.

71 REFRIGERATION COMPRESSORS—Carbondale, Div, Worthington Pump & Machinery Corp, Harrison, N. J. Bulletin C-1100-B11 covers vertical, 2-cyl refrigeration compressors, sizes 5x5-in. and smaller, with roller bearings. Drawings and cut-away photos show construction and operation.

72 COMPRESSORS—Frick Co, 325 Broadway, Waynesboro, Pa. 16-page bulletin No. 651-A gives applications, describes and illustrates large 4-cyl refrigeration compressors, enclosed type. Cutaway drawing shows construction and parts diagram.

73 COMPRESSORS—Frick Co, Waynesboro, Pa. Bulletin No. 112-G describes Frick enclosed-type ammonia compressors. Gives general features and lists, with photos, many applications in industrial and commercial plants.

74 COMPRESSORS — Chicago Pneumatic Tool Co, 6-8 East 44th St, New York, N. Y. 28-page illustrated booklet describes 2-stage, air-cooled portable compressors. New streamlining of models pictured, and important parts pointed out in explanatory photo. Includes descriptions of Hercules and Caterpillar engines, both used with Chicago compressors.

75 COMPRESSORS — Worthington Pump & Machinery Corp, Harrison, N. J. Bulletin S-550-B17 illustrates and describes Unibloc gas engine compressors, showing individual part construction.

76 COMPRESSORS—De Laval Steam Turbine Co, Trenton, N. J. 52-page catalog on centrifugal blowers and compressors contains information on construction with characteristics, turbine and motor drives, properties of gases and laws of compression, and a section on calculating pressure drop in piping.

CONDENSERS & ACCESSORIES

77 CONDENSER AND HEAT-EXCHANGER TUBES AND PLATES —American Brass Co, Waterbury, Conn. Anaconda Publication B-2, 60 pages, discusses corrosion factors, various tube and plate alloys, methods of manufacture, applications, etc. Comprehensive appendix includes physical properties, carrying capacities, tables on temperature conversion, steam pressures, and the Mollier diagram.

78 CONDENSER REPAIRS—C & C Corp, 381 Fourth Ave, New York, N. Y. 6-page folder describes new methods of repairing condenser tubes by stretching. Pictures illustrate method, and text gives advantages.

79 EXPANDERS—Gustav Weideke Co, Dayton, Ohio. Revised page No. 61, 1940 issue is designed for insertion in Ideal catalog 57, and covers Ideal adjustable condenser-tube expanders, made with tapered rollers.

80 BAROMETRIC CONDENSERS — Ingersoll-Rand Co, 11 Broadway, New York, N. Y. 20-page bulletin No. 9424 covers disk-flow, counter-current-type barometric condensers. Contains in addition to description and advantages, diagrams showing operation, specifications and suggested arrangements.

COOLING TOWERS & SPRAY EQUIPMENT

81 COOLING TOWERS—The Fluor Corp Ltd, 2500 S Atlantic Blvd, Los Angeles, Calif. Bulletin MDT-340 covers forced-draft and induced-draft cooling towers. Photos show various types and installations; bulletin also explains construction details and operation.

82 AERATORS—International Filter Co, 325 W 25th Pl, Chicago, Ill. 12-page bulletin No. 100 discusses the purifying functions of aeration and describes the various types of aerating equipment available. Several types described include forced-draft, coke-tray, MultiCone, spray and cascade types.

83 FLAT-SPRAY NOZZLES — Chain Belt Co, Milwaukee, Wis. 4-page folder No. 302 describes and gives particular applications for Rex flat spray nozzles. Photographs show applications.

84 COOLING TOWER—Marley Co, Fairfax Rd & Marley Ave, Kansas City, Kansas. 4-page bulletin No. 202 gives design, construction, specifications and features of new size cooling tower, offered at special low price.

85 COOLING TOWER — Marley Co, Fairfax Rd & Marley Ave, Kansas City, Kansas. 22-page bulletin No. 602 concerns new cooling tower developed by company, "Double-Flow", tells story of its development, and gives advantages over old types of towers.

86 SPRAY EQUIPMENT—Spray Engrg Co, 114 Central St, Somerville, Mass. 12-page catalog covers all equipment made by company. Includes listing of direct-pressure spray nozzles, spray guns, atomizing spray heads, Spraco air washers, spray cooling systems, humidifying systems, moistening equipment, and other spray and spray finishing machines.

DIESELS & ACCESSORIES

87 DIESELS—Baldwin De La Vergne Sales Corp, Paschall PO, Philadelphia, Pa. 4-page bulletin No. 149-A describes Model VO diesel engine, giving a short summary of construction and materials used.

88 HEAT EXCHANGERS—Sims Co, Erie, Pa. 16-page bulletin covers equipment for heat recovery from internal-combustion engines. Includes descriptions and applications of Sims heat exchangers, exhaust-heat boilers and other equipment.

89 DIESELS—Chicago Pneumatic Tool Co, 6 East 44th St, New York, N. Y. 16-page bulletin 768 describes type 8 and 9 diesel for continuous, heavy-duty service. Cutaway drawing of cylinder shows parts construction and graphs give rating curves.

90 DIESELS—Caterpillar Tractor Co, Peoria, Ill. 8-page folder describes many types of engines, engine-generator sets, marine engines, and Diesel-powered units for intermittent services.

91 PISTON RINGS—Cooktite Ring Sales Co, 1737 Howard Ave, Chicago, Ill. 28-page bulletin concerns ring sticking and cylinder scoring on Diesel engines. Reasons for ring sticking explained, photographs showing results of blowby, and other results of ring sticking detailed. Section included on control of lubricating oil consumption, and suggestions for location of oil-control rings presented.

92 PISTON RINGS—Cooktite Ring Sales Co, 1737 Howard Ave, Chicago, Ill. 8-page bulletin No. 1040 asks and answers 10 questions concerning operation of diesel engines fuel savings, efficiency of piston rings, and information about necessity of re-grooving pistons instead of installing new rings or pistons.

93 ENGINES—Worthington Pump & Machinery Co, Harrison, N. J. 4-page bulletin No. S-500–B39 describes Types EEGX and EEX convertible gas-diesel engines. Transverse sectional drawing shown, together with three steps for changing from fuel oil to gas operation.

94 PISTONS—Aluminum Co of America, Pittsburgh, Pa. 48-page booklet tells the story of aluminum pistons, including types of pistons, piston materials, piston finishes, and section on cylinder heads.

95 DIESEL SAFETY CONTROL — Fulton Sylphon Co, Knoxville, 8-page folder describes diesel safety control, operating from oil pressure or jacket-water temperature. Line drawing shows one application and smaller designs show typical installations.

96 DIESELS—Hercules Motors Corp, Canton, Ohio. 16-page booklet handles in question-and-answer form some comparisons between gasoline and diesel engines, general information concerning the principles behind the operation of a diesel.

97 DIESELS—Lister-Blackstone, Inc, 1706 South 68th St, Milwaukee, Wis. 16-page bulletin 130 describes Lister-Blackstone diesels and gives various applications for each type, as well as giving features, methods of control and advantages.

98 DIESEL-ELECTRIC SETS—Caterpillar Tractor Co, Peoria, Ill. Single-page leaflet, form 1823, covers series 11-52, and 13-66 diesel-electric sets, giving specifications, dimensions and fuel-consumption curves.

99 DIESELS—Ingersoll-Rand Co, 11 Broadway, New York, N. Y. 38-page bulletin, Form 10210, illustrates and describes I-R Type S diesels, which are medium-speed, heavy-duty, continuous-service engines.

100 GAS ENGINES — Worthington Pump & Machinery Corp, Harrison, N. J. Bulletin S-550-B15 describes vertical 4-cycle, totally-enclosed gas engines. Illustrations show base and crankshaft assembly, piston and rod construction and cutaway of cylinder head and valves.

101 DIESEL-ELECTRIC SET—Lister-Blackstone, Inc, Milwaukee, Wis. 4-page bulletin 110 describes diesel-electric set, with calculations to figure how much wattage is needed, and what size unit to buy for specified loads.

102 FUEL INJECTORS — Diesel Equipment Co, Ravenswood Ave, Chicago, Ill. 8-page folder index A120 describes new addition to line, a water-cooled diesel fuel-injection nozzle. Color plate shows how unit is cooled and another shows blueprint-type section.

103 DIESEL COOLING SYSTEMS—Binks Mfg Co, 3114 Carroll Ave, Chicago, Ill. Bulletin 350 entitled "Closed-Type Water-Cooling Systems for Diesel Engines" describes in detail use of heat exchanger on diesel.

104 DIESELS — Atlas-Lanova Div, Atlas-Imperial Diesel Engine

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Co, 228 N La Salle St, Chicago, Ill. 6-page bulletin 1000 gives a general discussion covering the advantages of diesel power, with description of Atlas-Lanova engines. Specifications included, and section provides guide for user in purchasing correct size and type engine.

DUST COLLECTORS

105 DUST COLLECTORS—Buell Engineering Co, 70 Pine St, New York, N. Y. 24-page booklet on "Dust in Industry" is in two sections. Section one has general information on dust collection; section two deals specifically with Van Tongeren Theory and its advantages.

106 DUST COLLECTOR — American Foundry Equipment Co, Mishawaka, Ind. Circular No. 42 describes American Assembled Type "Dustube" dust collector.

107 DUST COLLECTORS — Prat-Daniel Corp, Port Chester, New York, 8-page catalog No. 108 covers Thermix tubular dust collectors. Practical advantages of design explained, construction details shown, and suggested layout with explanatory remarks presented. Brief listing of other types included.

108 DUST COLLECTORS — Pangborn Corp, Hagerstown, Md. 4-page mailing folder illustrates several applications of Pangborn dust collectors and lists companies who use them.

109 DUST COLLECTORS—Buell Engrg Co, 70 Pine St, New York, N. Y. 8-page booklet gives the case of fractional vs over-all efficiency guarantees for dust collectors. Measurement of dust particles explained, efficiency curves charted, and conclusions drawn from experiments.

ELECTRICAL METERS & INSTRUMENTS

110 LOAD ANALYZER — Electrical Facilities Inc, 4224 Holden St, Oakland, Calif. Catalog Section C, Bulletin 300, describes Knopp load analyzer, specially designed for making power-factor and related measurements. Covers features, applications and capacities; single-page leaflet.

111 TIME-DELAY RELAYS AND THERMOSTATS—Thomas A Edison, Inc, West Orange, N. J. Group of bulletins describe sealed, fixed-adjustment, thermostat, and time-delay relays. Delays up to 20 minutes are available. One bulletin describes relay control for demand reduction by consecutive starting of several motors in a group.

112 CLAMP AMMETER — Columbia Electric Mfg Co, Cleveland, Ohio. 6-page bulletin, Section 400, pictures applications of Tong-Test ammeter and gives dial ranges found on different instruments.

113 CAPACITORS—General Electric Co, Schenectady, N. Y. "Power Factor and its Improvement" is subject of GEA-3225. Gives definition of power factor and tells what capacitors can do to improve it.

114 VOLTAGE REGULATORS—Burlington Instrument Co, 301 N Main St, Burlington, Iowa. 8-page bulletin GB-234 describes and illustrates Type GB automatic generator voltage regulators. Features, schematic drawings and applications included.

115 RHEOSTATS—Ohmite Mfg Co, Chicago, Ill. 96-page catalog 40 contains information on precision and close control rheostats, tap switches, and resistors. Also provides manual of resistance measurements and reference tables.

116 INDICATOR—Electrical Facilities, Inc, 4224 Holden St, Oakland, Calif. 2-page leaflet contains description of Knopp phase-sequence indicator, with details on construction of instrument and several typical installations.

117 RESISTORS—Hardwick - Hindle, Inc, Newark, N. J. 12-page catalog No. 40 lists, describes and illustrates line of resistors and rheostats, and includes specifications and prices for each.

118 PANEL INSTRUMENTS — Roller Smith Co, Bethlehem, Pa. 8-page catalog No. 4120 covers 3- and 4-in. panel instruments. Current range and prices given for numerous models.

119 PANELBOARDS — Westinghouse Electric & Mfg Co, East Pittsburgh, Pa. 4-page leaflet presents descriptions of Nofuze panelboards, with advantages and conveniences of several types. Several panel arrangements included.

120 AUTOMATIC SYNCHRONIZER —Burlington Instrument Co, Burlington, Iowa. 4-page bulletin No. SN-1 gives the principle of operation of the synchronizer, together with curves illustrating proper and improper conditions for synchronizing.

FANS

121 FANS—The New York Blower Co, 32nd St & Shields Ave, Chicago, Ill. 24-page catalog present capacity tables for type ME centrifugal fans. Slow and high speed tables given, as well as section of engineering notes.

122 FANS—Wagner Electric Co, 6400 Plymouth Ave, St. Louis, Mo. 18-page bulletin on air circulating and ventilating equipment, discusses where and how to use this equipment for both cooling and ventilating purposes.

FILTERS

123 AIR & LIQUID FILTERS—Staynew Filter Corp, Rochester, N. Y. 36-page bulletin describes various types of air filters for air compressors, pumps, diesel and other internal-combustion engines, also pipeline models for air and liquids.

124 AIR FILTER—Air-Maze Corp, 5200 Harvard Ave, Cleveland, Ohio. Form DH-640 gives models, capacities, dimensions and shipping weights of standard Air-Maze "DH" assemblies. Typical installations shown.

125 AIR FILTERS—Air-Maze Corp, 5200 Harvard Ave, Cleveland, Ohio. 4-page folder, No. M-340, presents construction features, efficiency, pressure drop, dust capacity, etc, of Multimaze air filters.

126 AIR CLEANER—American Air Filter Co, Inc, Louisville, Ky. 8-page bulletin 130-C describes American Cycoil oil-bath air cleaner, giving description of operation and installation instructions. Also covers other AAF products.

GASKETS & PACKING

127 GASKETS—Goetze Gasket & Packing Co, Inc, New Brunswick, N. J. 64-page handbook and catalog on industrial gaskets contains engineering data, shows many new and improved products, gives complete size and price information. Profusely illustrated.

128 PACKING—The Sea-Ro Packing Co, Wood-Ridge, N. J. Illustrated leaflet describes new armored "Nek-Seal" packing for reciprocating rods, valve stems and rotating shafts. Includes installation instructions.

129 PACKINGS — Wayne Davies Packings, Inc, 325 W Huron St, Chicago, Ill. 4-page bulletin concerns Davies double-U packings, showing sectional views illustrating construction, and questionnaire for readers who desire information.

130 MECHANICAL PACKINGS—A W Chesterton Co, 64 India St, Melrose, Mass. 20-page Catalog No. 20 covers only those packings essential to efficient plant maintenance, eliminating hodgepodge of overlapping and duplicating styles. Recommendation chart shows style best suited to various packing problems. Also includes data on tube scrapers.

131 PACKINGS—Greene, Tweed & Co, 101 Park Ave, New York, N. Y. 12-page bulletin has descriptive information on mechanical pump packings and sheet packings. Chart lists each type of packing and tells under what conditions, in what substances each particular packing is suited.

132 PACKING—Belmont Packing & Rubber Co, East Butler & Sepviva Sts, Philadelphia, Pa. Packing Catalog uses new technique in describing packing. Each type is on separate page, with all information pertaining to that type on that page, together with illustrations. Engineering data and recommendation charts also included.

133 PACKINGS—France Packing Co, Tacony, Philadelphia, Pa. Catalog M shows various designs of metal packing for piston rods and stems in any type engine, pump or compressor, and lists improved types of France packing for oil, gas, refrigeration, and general use.

134 PACKINGS—Belmont Packing & Rubber Co, Butler & Sepviva Sts, Philadelphia, Pa. 84-page catalog No. 40, illustrates and describes complete line of Belmont products, including packings of all types, sizes, and for different services. Also has section covering miscellaneous engineering data.

135 PACKINGS—E F Houghton & Co, 244-50 W Somerset St, Philadelphia, Pa. 24-page catalog covers Vim packings, including application of leather packing, packing, disks, and gaskets, twelve don'ts for packing users, and packing price lists.

136 GASKETS — Goetze Gasket & Packing Co, New Brunswick, N. J. 4-page folder describes all types of gaskets and gives symbol used for each one, showing cross-section and explaining construction.

136A SEALING COMPOUND—Collins Packing Co, Inc, 401 N Broad St, Philadelphia, Pa. Leaflet describes "Collonite" Paste No. 7 for screw-thread, pipe-thread and gasket joints. Will not decompose when exposed to air, heat or acids, protects against corrosion and will not freeze up to 50 F below zero.

GEARS, PULLEYS & CHAINS

137 ROLLER CHAINS & SPROCKETS—The Whitney Chain & Mfg Co, Hartford, Conn. Catalog (Stock List V-150) covers Whitney roller chains and sprockets available as stock items at central distribution points. Front part of book contains necessary information for selection of stock drives.

138 ROLLER CHAIN—Morse Chain Co, Ithaca, N. Y. Bulletin R-40 contains information on construction of channel-lubricated, interchangeable roller chain, application details, tells how to select right chain for your drives, gives performance data and engineering information.

139 CHAIN DRIVES—Diamond Chain & Mfg Co, Indianapolis, Ind. 4-page pamphlet, "Progress of Roller-Chain Drives" shows progress of roller-chain drives, from single- to 10-strand, by series of application illustrations.

140 CHAIN DRIVES—Morse Chain Co, Ithaca, N. Y. 24-page Bulletin No. R-54 contains detailed information on construction, capacities, and applications of Morse roller-chain drives.

141 GEARS & CHAINS—Boston Gear Works, N Quincy, Mass. 288-page catalog No. 53 contains specifications and stock prices on gears, chains and sprockets, ratio motors, speed reducers, flexible couplings. Also has methods for calculating gear and speed reducer drives.

142 GEARED DRIVES — Westinghouse Electric & Mfg Co, East Pittsburgh, Pa. 24-page data booklet 3650 describes complete line of type SU speed increasers. Presents application data, construction features, views and explanations of modern processes used, tables and sketches giving dimension information, ordering instructions and pictures of successful applications.

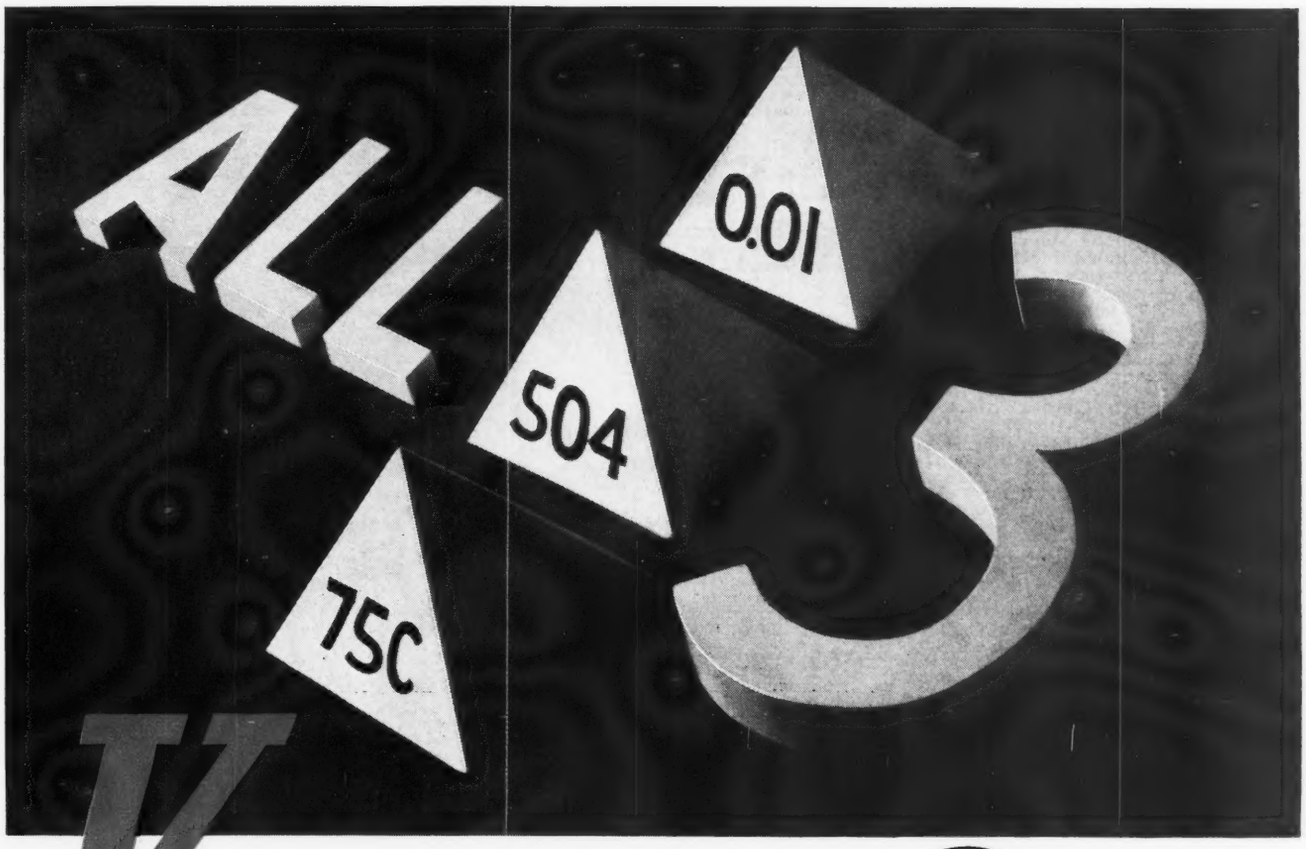
143 PULLEY COVERING—Non-Slip Pulley Covering Co, 777 Hertel Ave, Buffalo, N. Y. . 2-page leaflet describes "Non-Slip" pulley covering, formerly only available made-to-order, but now for all belt users. Method of application described, and advantages listed.

144 GEAR REDUCERS—Link-Belt Co, 307 N. Michigan Ave, Chicago, Ill. Booklet No. 1519-A presents information on complete line of Herringbone Gear Reducers. Addition of new sizes and changes in construction have revised both horsepower ratings and dimensions.

145 PULLEY FACING — Powerlox Mfg Co, 152 W 42nd St, New York, N. Y. 2-page leaflet describes Powerlox, non-slip pulley facing. Advantages and testimonials from users included.

HEATING & VENTILATING EQUIPMENT

146 HUMIDIFICATION — Armstrong Machine Works, 812 Maple St, Three Rivers, Mich. 8-page illustrated bulletin, "Facts You Should Know About



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Combines ALL 3: moisture resistance (0.01), long life (504), and heat resistance (75 C). These contribute to long-time low cost

0.01 This is the water-absorption factor—0.01 gram per sq in. of the surface submerged. Unusually low, it shows that Versatol is as waterproof as any rubber insulation can be and why it has influenced the trend toward lower-cost nonmetallic cable.

504 This is the result of a standard accelerated-aging life test—504 hours in the oxygen bomb. It indicates a durability of 50 years of natural aging. Such long life tends to do away with costly maintenance.

75 C This is the operating temperature—75 degrees centigrade. It may not only permit running the cable in hot locations but it may also effect savings in conductor size.

Every important job that calls for a high-quality rubber-insulated cable deserves Versatol. Ask for more details and prices. Address nearest G-E office or General Electric, Schenectady, N. Y.

TELLURIUM MOTOR LEAD

VERSATOL NOW STANDARD

All types of G-E rubber-insulated cable for use on transit vehicles and other rolling stock now have Versatol as the standard insulation. For this service, the tellurium-rubber jacket has proved highly satisfactory—it is tough, will stand much abrasion and flexing. New bulletins are available.

This is just one of many types of Versatol insulated cable. There are others for power and lighting circuits; and you profit most when the type you select is *always* the right one. To this end, make use of G-E engineering service and get the most for your cable dollar. Look to the *right* type for long-term economy.

GENERAL ELECTRIC

500-5

Humidification", discusses cause and cure of troubles accompanying dry air during winter heating season. Tables list desirable relative humidity for industrial processes, the regain for various materials, amount of moisture required to raise relative humidity to desired point, etc.

147 VENTILATING SETS—De Bothezat Ventilating Equipment Div, American Machine & Metals Inc, East Moline, Ill. 24-page booklet describes axial-flow ventilating sets, volume and pressure types. Booklet includes charts showing friction and duct sizing for round and rectangular ducts.

148 HEATING COILS—Air Conditioning Div, Fedders Mfg Co, Buffalo, N. Y. 52-page catalog describes Fedders Type K heating coils, presenting modern design, features, dimensions, and total external heating surface. Also includes "Time Saver" charts showing temperature rise for various operating conditions, air-temperature rise, and other engineering data.

149 UNIT HEATERS—Young Radiator Co, Racine, Wis. 4-page folder gives features of construction and typical installations of Young "Vertiflow" unit heaters. Capacity and dimension tables presented.

INSULATION

150 INSULATION—Baldwin-Hill Co, Trenton, N. J. 12-page bulletin contains full information on various insulating products made by company, including data on new "Mono-Block" boiler insulation good for temperatures up to 1600 F.

151 INSULATION—Ehret Magnesia Mfg Co, Valley Forge, Pa. 260-page manual consists of technical information on insulations, heat insulations, cold insulations, insulation accessories and fire-proofing materials, pre-sealed insulated pipe, insulation recommendations and specification forms, refractory cement, valley-forge packings, building insulations and materials. Also asbestos fibres and textiles, useful data on heat losses, thermal expansion of pipes, conversion tables, saturated-steam table, superheated-steam table, weights, measures, and general index.

151A INSULATING CEMENT—Refractory & Insulation Corp, 381 4th Ave, New York, N. Y. Bulletin I-66 describes "heat-check" all-mineral cement for insulating valves, flanges, fittings, boiler drum heads, etc, for temperatures up to 1800 F.

152 ASBESTOS—Keasbey & Mattison Co, Ambler, Pa. "Legends of Asbestos" is accumulation of stories about asbestos carried down from early times. Included are "Marco Polo's Salamander," "Charlemagne's Tablecloth," and others.

152A BLANKET INSULATION—Refractory & Insulation Corp, 381 4th Ave, New York, N. Y. Bulletin I-64, in 2 colors, contains practical information on blanket insulation for flat or curved surfaces at temperatures to 1200 F. Includes chart of comparative heat conductivities and another showing how to select proper thickness.

153 INSULATION TESTER—James G Biddle Co, 1211-13 Arch St, Philadelphia, Pa. 8-page bulletin 1655 describes hand-driven "Megger" insulation testers. Additional information on insulations included, one being an explanation of the time factor in taking "Megger" readings.

154 INSULATION PRODUCTS — Philip Carey Co, Lockland, Ohio. "Proved Protection Against Wasted Profits" suggests points to check for profit-leaks, and gives descriptions of Carey products which help stop those leaks.

SHAFTING & HANGERS

155 PILLOW BLOCK—Dodge Mfg Corp, Mishawaka, Ind. 18-page bulletin A-325 concerns Dodge-Timken double-interlock pillow block. In addition, tables provide easy selection medium for other products in Dodge line. Feature is three-dimensional view of new pillow block. with colored glasses for viewing.

156 LINESHAFT BOXES — Fafnir Bearing Co, 77 Booth St. New Britain, Conn. 8-page booklet form AD348 includes tables on horsepower of belting, horsepower of shafting, and other tables with description and illustrations of lineshaft boxes.

157 POWER-TRANSMISSION MACHINERY—T B. Wood's Sons, Chambersburg, Pa. 160-page catalog No. 82 covers complete line of Wood's power-transmission machinery, including pillow blocks, sheaves, shafting, clutches, hangers, bearings, pulleys, etc.

LUBRICATING EQUIPMENT

158 LUBE-OIL PURIFIER — S G Franz Co, Inc, 161 Grand St, New York, N. Y. Bulletin 16 describes magnetic unit that extracts coarse and small iron particles from suspension in lube-oil circulating systems. Full flow for diesel and internal-combustion engines, turbines, etc.

159 LUBE-OIL PURIFIER—Honan-Crane Corp, Lebanon, Ind. 8-page illustrated Bulletin 100L gives engineering data and specifications on the "Crane" continuous oil refiner for gas or diesel industrial engines. Drawings and tables show operation and construction.

160 LUBRICATION—Tide Water Associated Oil Co, 17 Battery Place, New York, N. Y. 16-page booklet, "Principles of Plain Bearing Lubrication" gives fundamentals of lubrication, the hydro-dynamic theory, boundary and extreme-pressure lubrication, bearing design and grooving, selection of lubricants and others related to subject.

161 OILERS—Trico Fuse Mfg Co, Milwaukee, Wis. 4-page bulletin concerns Trico unbreakable wick-feed oilers. Types LA, LB, LC, LD included. Brief descriptions of each type presented, together with photo of oiler, and table listing dimensions. General information on all types of oilers included.

162 OIL FILTER—Goulds Pumps, Inc, Seneca Falls, N. Y. 4-page folder describes Gould fullers-earth filter combined with a centrifuge. Flow diagrams are included, ratings and prices are listed.

163 LUBRICATORS—C A Norgren Co, Inc, 226 Santa Fe Drive, Denver, Co. 20-page catalog No. 300 pictures and describes Norgren pneumatic products, including sight-feed automatic air line lubricator, automatic lubricators, filters, regulating and reducing valves, relief and blow valves, couplings, hose stems, and hydraulic hose assemblies.

164 LUBRICATION — New Departure Div, General Motors Corp, Bristol, Conn. 15-page booklet is presented as aid to choice of correct lubricants for ball bearings. Presents simple method of determining proper grade and viscosity of oil for various operating temperatures and bearing speeds.

165 OIL—E F Houghton & Co, Somerset St, Philadelphia, Pa. 4-page booklet No. 2-148 covers E P gear oils, their characteristics, applications, and physical properties.

166 OIL SEPARATOR — Gale Oil Separator Co, 405 Lexington Ave, New York, N. Y. 6-page bulletin covers "Profits from Waste Fluids" and tells about oil separator. Includes description of construction, and installation.

167 GREASE CUPS—Hunter Pressed Steel Co, Lansdale, Pa. 8-page folder describes and illustrates Hunter grease cups and oil containers together with brief instruction on their use.

MAINTENANCE EQUIPMENT

168 NON-SLIP FLOOR WAX—Flexrock Co, 2377-A Manning St, Philadelphia, Pa. Literature describes non-slip floor wax, Carnauba product processed with Neoprene. Also contains details of trial offer for prospective users.

169 CONCRETE—Flexrock Co. 2377-A Manning St, Philadelphia, Pa. 4-page folder illustrates applications and describes Contretdense, compound used for resurfacing floors and patching holes in concrete floors. Method of mixing and application included.

170 ROOFING—Porcelain Steels, Inc, Cleveland, Ohio. 4-page bulletin describes Por-Ce-Lok, porcelain-enameled roofing and siding. Colors available, sizes, method of application all included in booklet.

171 BUILDING MAINTENANCE — Flexrock Co, 2377-A Manning St, Philadelhia, Pa. 68-page handbook shows how to do many odd jobs at lower cost with better results. Non-technically written, has over 150 pictures, diagrams and mechanical drawings.

172 FLOOR DYE — Flexrock Co, 2377-A Manning St, Philadelphia, Pa. 4-page bulletin describes Colorflex, resin-base floor dye. Instructions concerning application given, and features of coating are presented. Details of trial offer also listed.

MATERIALS-HANDLING EQUIPMENT

173 CONVEYOR - ELEVATORS — Stephens-Adamson Mfg Co, Aurora, Ill. 60-page catalog 140 describes complete line of "Redler" conveyor-elevators for conveying and elevating en masse any pulverized, granular, small-lump or flaky material, in any direction. Drawings, photos and tables give specification and operating data.

174 WINCHES — Stephens - Adamson Mfg Co, Aurora, Ill. Bulletin 340, 4 pages, covers hand and motor winches for lifting and pulling loads up to 3000 lb. Well illustrated with drawings and photos; data includes dimensions and specifications.

175 MATERIALS HANDLING—Link-Belt Co, 307 N Michigan Ave, Chicago, Ill. 48-page book No. 1700 pictures numerous typical applications of Link-Belt products in industry. Added feature is comparison of various standards of living throughout the world, showing various amounts needed to purchase commodities in different countries today.

176 CLAMSHELL BUCKETS—Blaw-Knox Co, Pittsburgh, Pa. Catalog 1757 is devoted to two-line lever arm buckets and lists 242 buckets according to rated capacity. Records service classification of each bucket, and lists dimensions and physical data.

177 MATERIALS HANDLING—Lewis-Shepard Sales Corp, Watertown, Mass. Catalog No. 21 commemorates 25th Anniversary of company, and covers over 175 of items made by company. Catalog has half inch visible tab for filing.

178 CONVEYORS—Brady Conveyors Corp, 20 W Jackson Blvd, Chicago, Ill. 8-page bulletin describes elevating and conveying machinery put out by company. Includes reciprocating plate feeders, dump hoppers and gratings, continuous-bucket elevators, screw conveyors, flight conveyors, pivoted-bucket conveyors, belt conveyors and trippers.

179 MATERIALS HANDLING—C O Bartlett & Snow Co, Cleveland, Ohio. General catalog No. 90, 372 pages, gives complete details of B-S elevators, conveyors, chains, sprockets, crushers, gates and miscellaneous equipment. Replaces No. 50 and 74 catalogs.

180 HOISTS—Coffin Hoist Co, 800 Walter St, Danville, Ill. Observing 12th anniversary of founding of company, catalog presents descriptions of all types of Coffin hoists and utility maintenance tools. Catalog No. G-3.

181 HOISTS—Coffing Hoist Co, Danville, Ill. 20-page bulletin G-1 describes all Coffing products, including trolleys, spur-gear chain hoists, utility maintenance tools, differential hoists, rachet lever hoists, spur-gear gravity hoists, electric hoists and load binders. Includes parts and price list.

182 CONVEYORS—Robins Conveying Belt Co, 15 Park Row, New York, N. Y. 4-page bulletin No. 109 describes and illustrates complete line of Robins equipment, including conveyors, return idlers, elevators, screens, buckets, trippers, feeders, crushers, weigh larries, continuous bucket conveyors, etc.

METAL HOSE & TUBING

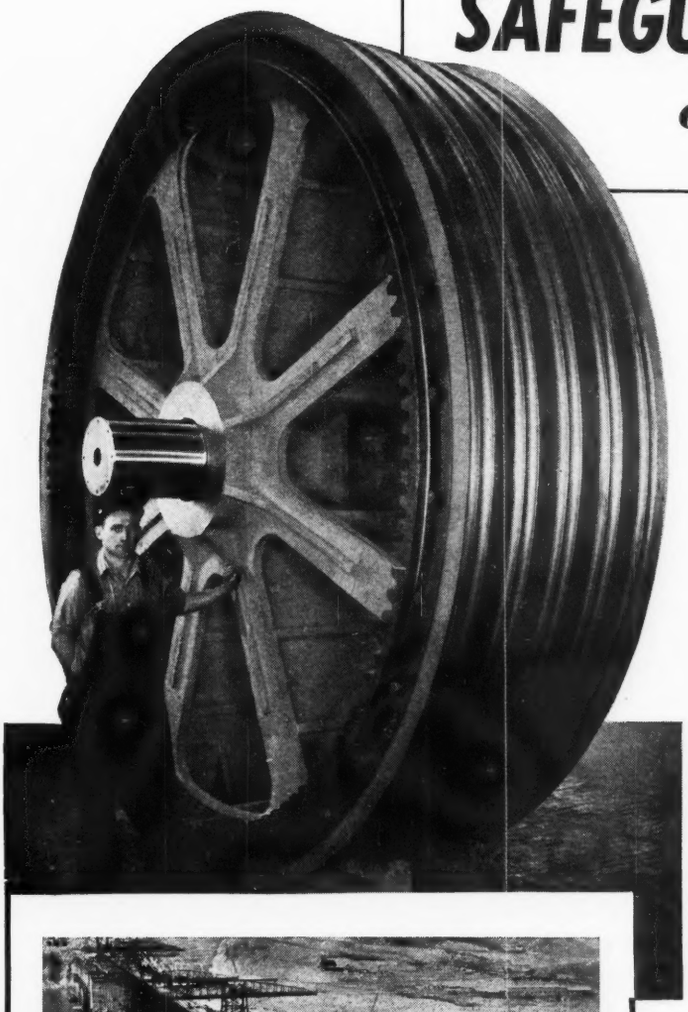
183 BRONZE STEAM HOSE—Pennsylvania Flexible Metallic Tubing Co, 72nd St and Powers Lane, Philadelphia, Pa. Bulletin 52-G covers all-metal bronze "Pennflex" steam hose and clincher couplings. Includes prices and other data.

184 GALVANIZED STEEL HOSE—Pennsylvania Flexible Metallic Tubing Co, 72nd St and Powers Lane, Philadelphia, Pa. Bulletin 59-G, on all-metal flexible hose and couplings for oil, grease, hot tar, paint, gas, air. Contains general descriptive and price data.

How engineers

SAFEGUARD CASTINGS

on hard jobs...

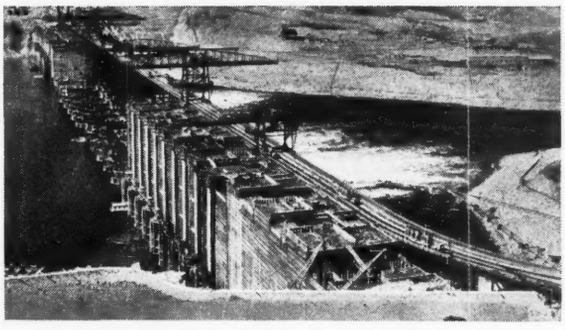


...they specify

NICKEL

CAST STEEL + 2.60% NICKEL

One of four 12′2″ sheaves for the Snake River lift bridge between Lewiston, Idaho, and Clarkston, Wash., cast in the Columbia Steel Co. foundry at Pittsburg, Calif., from a 2.60% Nickel steel showing tensile strength of over 90,000 p.s.i. Nickel added to steels increases toughness, wear resistance and minimizes fatigue strains.

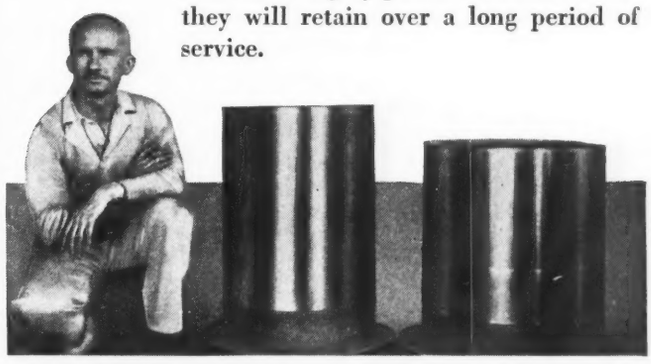


CAST BRONZE + 1.00% NICKEL

When water backs up behind Grand Coulee Dam there'll be a big push on 102″ valves which control the spillway conduits. These valves are made positive in action by glands and bushings of 1% Nickel bronze. Fourteen tons of these castings were produced by Atlas Brass Foundry, Los Angeles, for the Consolidated Steel Corp. Properties of this Nickel bronze greatly exceeded specifications, providing an added safety factor welcomed by every engineer. Consultation on problems involving use of Nickel is invited.

CAST IRON + 1.20% NICKEL

These mandrels are "stand-ins" for Colorado River Aqueduct pump shafts. By their use, new bearing pieces can be fitted and scraped to exact fit without the necessity for doing such tedious work on the pump shafts themselves. Reliance Regulator Co., Alhambra, Calif., produced castings from a Nickel-chrome-molybdenum composition which developed a tensile strength 20% in excess of the 45,000 p.s.i. minimum requirement, a readily machinable hardness and a highly polished surface which they will retain over a long period of service.



THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

185 FLEXIBLE METAL TUBING—Pennsylvania Flexible Metallic Tubing Co, 72nd St, & Powers Lane, Philadelphia, Pa. 8-page bulletin 90 covers Penflex Weld high pressure flexible all-metal tubing and couplings, showing how the tubing looks with standard and wide spacing. Numerous applicatons suggested.

186 FLEXIBLE METAL HOSE—Chicago Metal Hose Corp, Maywood, Ill. 36-page catalog G-31 covers Rex-Weld and Rex-tube flexible metal hose. Also includes descriptions of stainless-steel bellows, Rex bellows and diesel exhaust hose.

187 TUBING—Carpenter Steel Co, Reading, Pa. Catalog covers applications, gives tables on corrosion resistance, physical properties, tolerances, weights, sizes and diameters of Carpenter welded stainless tubing.

METALS & METAL SPRAY

188 METAL SPRAY—Master Metal Spray, Inc, 2527 Magnolia St, Oakland, Calif. 4-page bulletin describes new Speedmaster metal-spray gun, showing advantages and method of operation. Also covers Stevens moisture separator.

189 WROUGHT IRON—A M Byers Co, Pittsburgh, Pa. Bulletin "101 Uses for Wrought Iron" tells just that, and also illustrates numerous applications suggested.

190 METALS & ALLOYS—Babcock & Wilcox Tube Co, 85 Liberty St, New York, N. Y. Technical Bulletin 12-A contains revised information and technical data on B&W seamless alloy tubes and pipe for high-pressure and temperature services.

191 COATING PROCESS—Metallizing Engrg Co, Inc, 21–07 41st Ave, Long Island City, N. Y. 8-page bulletin tells what metals can be "Metcolized", what equipment can be treated, and reports of results from various users.

192 METALS & ALLOYS—International Nickel Co, Inc, 67 Wall St, New York, N. Y. 16-page, pocket-size booklet contains uses and properties of nickel and high nickel alloys, including three pages on mechanical, chemical and physical properties.

193 METAL SPRAY—Metallizing Engineering Co, 21–07 41st Ave, Long Island City, N. Y. Metco News is devoted to latest developments and applications of metal spraying process.

METERS & INSTRUMENTS
(Not Electrical)

194 TEMPERATURE INSTRUMENTS—Leeds & Northrup Co, 4934 Stenton Ave, Philadelphia, Pa. 32-page illustrated catalog N-33-161 shows how knowledge of operating temperatures enables operators to act promptly, at the first sign of a temperature rise, to protect units agains overheating, and also provides reliable guide for maximum safe loading.

195 REGULATORS AND CONTROLS—General Controls Co, 801 Allen Ave, Glendale, Calif. Latest 1940 Catalog covers magnetic gas valves, magnetic industrial valves for water, oil, gas, etc, magnetic lever valves, thermostats, automatic gas shut-offs, relays, low water cut-offs, boiler regulators, strainers, etc. Each model and type illustrated; charts and tables give complete engineering data.

196 FLOWMETERS—Brown Instrument Co, Philadelphia, Pa. Catalog 2007 covers complete line of electric flowmeters for measurement and control of steam, air, oil, water, chemicals, etc. Schematic diagrams show construction and piping layouts. Also describes design features and operating principles.

197 THERMOMETERS AND PRESSURE GAGES—Brown Instrument Co, Philadelphia, Pa. Catalog 6706 covers complete line of vapor-actuated, gas-actuated, mercury-actuated and portable thermometers for indicating, recording and controlling processing operations. Design features such as rectangular case, flat spiral actuating elements, overload safeguard, etc, fully described.

198 POTENTIOMETERS — Leeds & Northrup Co, Stenton Ave, Philadelphia, Pa. 24-page illustrated catalog covers Type K potentiometers and accessories, showing principles of operation and various applications.

199 METAL BELLOWS—The Fulton Sylphon Co, Knoxville, Tenn. 4-page bulletin describes Sylphon bellows, used as diaphragms in numerous pieces of equipment. Specifications and application data given.

200 PRESSURE REGULATOR—Foster Engrg Co, Newark, N. J. 4-page bulletin 39Q1 concerns Foster pressure regulator for steam, liquids and gases. Application, features, and principle included, together with general description of regulator. Method of installation, adjustment, dismantling and operation presented.

201 METER—Precision Control Co, 899 Bryant St, San Francisco, Calif. 8-page bulletin No. 201 describes Precision combustion efficiency meter, CO_2 analyzer, and portable CO_2 meter, with illustrations and piping diagrams.

202 DRAFT GAGES—F W Dwyer Mfg Co, 565 W Washington Blvd, Chicago, Ill. Bulletin No. 31 illustrates Dwyer transparent draft gages, including new listings as well as complete data on applications and specifications.

203 REGULATORS—Northern Equipment Co, Erie, Pa. 15-page bulletin No. 429 describes Copes Flowmatic regulator, giving principle of operation, schematic drawings, and lists of specifications and users.

204 TACHOMETERS—James G Biddle Co, 1211-13 Arch St, Philadelphia, Pa. 4-page bulletin 1650 describes Biddle instruments for measuring speed, frequency and vibration.

205 THERMOCOUPLES — Leeds & Northrup Co, Stenton Ave, Philadelphia, Pa. 40-page catalog N-33A(6) is described as first complete one on thermocouples published by company. Illustrations and listings arranged so that parts, accessories, and complete assemblies are easily available.

206 SPEED INDICATORS—Herman H Sticht & Co, 27 Park Pl, New York, N. Y. Bulletin 740 describes Velox speed indicator for speeds up to 100,000 rpm. Single-page leaflet also illustrates same and tells how it works.

207 THERMOCOUPLES — Wheelco Instruments Co, 1923 S Halstead St, Chicago, Ill. 16-page booklet covers products made by company, including thermocouples, thermocouple wire, lead wire, insulators, protecting tubes, etc.

208 PYROMETERS—Foxboro Co, 38 Neponset Ave, Foxboro, Mass. 16-page bulletin 190-3 describes potentiometer recording pyrometers for recording of industrial temperatures. Table of potentiometer chart ranges, as well as complete specifications of recording instruments also included.

209 METERS—Pittsburgh Equitable Meter Co, 400 N Lexington Ave, Pittsburgh, Pa. 16-page booklet entitled "Industrial Metering" points out ways and means of cutting costs through the use of liquid and gas meters, and describes complete meter line of company. Brief description of Merco Nordstrom valves also presented.

210 DRAFT GAGES—F W Dwyer Mfg Co, 565 W Washington Blvd, Chicago, Ill. 4-page bulletin No. 22 describes Dwyer Co, indicators, series-testing sets, and portable draft gages.

211 TACHOMETERS — Herman H Sticht Co Inc, 27 Park Place, New York, N. Y. Folder No. 700 entitled, "Where Accurate Knowledge Counts" illustrates and describes line of speed-measuring instruments, including tachometers, tachoscopes, etc.

212 THERMOMETERS—C J Tagliabue Mfg Co, 550 Park Ave, Brooklyn, N. Y. 16-page catalog illustrates and describes etched-stem thermometers and hydrometers. Also covers regular line of standard thermometers and hydrometers and complete listings of ASTM and general thermometers.

213 TEMPERATURE REGULATORS—Foster Engineering Co, 109 Monroe St, Newark, N. J. 16-page booklet, Catalog 70—Bulletin 11, covers Foster Type T temperature regulators for steam, air, liquids and gases. Handsomely illustrated in 2 colors, with many photos, cutaway and line drawings. Charts and tables give complete data on performance, application, etc.

214 POTENTIOMETER — J-B-T Instruments, Inc, 441 Chapel St, New Haven, Conn. 6-page folder describes new portable potentiometer-pyrometer, with applications in industry and science. Section on how to order and operate included.

215 RECORDING AND INDICATING INSTRUMENTS — Taylor Instrument Cos, Rochester, N. Y. 64-page catalog covers all types of recording, indicating and controlling instruments made by company. Included as service to engineers and practical men are fundamentals on rate-of-flow measurements, calculations, and glossary of terms, as well as typical sections from uniform scale charts.

216 METERS—Foxboro Co, Foxboro, Mass. 47-page illustrated bulletin covers use of flowmeters wherever air or gas, liquid or steam is produced and distributed. Also provides data on remote measurement and flow control, universal flowmeters, pressure-compensating meters, bell-type meters and others.

217 FLOWMETER—Ring Balance Instrument Co, 2511 W 24th St, Chicago, Ill. 4-page bulletin No. 401 covers ring-balance flowmeters for all commercial fluids. Operating principle and main dimensions presented through drawings.

218 THERMOMETERS — Brown Instrument Co, Philadelphia, Pa. Catalog No. 6705 covers complete line of circular-case thermometers and pressure gages, indicators, recorders and controllers, as well as self-contained and portable models.

219 FEEDWATER REGULATOR — Northern Equipment Co, Erie, Pa. Bulletin 429 describes Copes Flowmatic regulator. Printed in three colors, bulletin is illustrated with operating diagrams, performance charts and installation photographs.

220 FLOWMETERS—Brown Instrument Co, Philadelphia, Pa. 4-page bulletin, 'Increase Production Without Plant Expansion?" includes pictures of various Brown steam flowmeters and CO_2 meters, explaining how these instruments can be used advantageously in the plant.

221 CO_2 INDICATOR—Bacharach Industrial Instrument Co, 7000 Bennett St, Pittsburgh, Pa. Picture series illustrates operation of "Fyrite" indicator. Advantages listed and testimonials offered. Bulletin 337.

222 PRESSURE REGULATORS — Fisher Governor Co, Marshalltown, Iowa. 8-page bulletin D1 contains information concerning line of pressure controllers, including Wizard pilot control valves, series 4300 and 4100.

223 THERMOMETERS—C J Tagliabue Mfg Co, Park & Nostrand Ave, Brooklyn, N. Y. 24-page catalog No. 1125C covers TAG industrial thermometers, including miscellaneous metal and woodback thermometers, hygrometers, U Gages, mercurial vacuum gages and mercurial barometers.

224 FLOWMETER — American District Steam Co, North Tonawanda, N. Y. Bulletin No. 35-83 describes the Adsco flowmeter, giving the principle of operation, features of construction and types available.

MOTORS

225 INDUCTION MOTORS — Reliance Electric & Engrg Co, 1068 Ivanhoe Rd, Cleveland, Ohio. 4-page bulletin No. 119 covers Type AA, squirrelcage induction motors for 2- and 3-phase alternating-current circuits, 40-C continuous duty, open rating. Photos and drawings show construction steps.

226 SMALL MOTORS—Westinghouse Electric & Mfg Co, E Pittsburgh Pa. "Small Motor Selector Guide", No. F-8525, an illustrated folding sheet, contains all essential data needed to fit the right motor to any job. Full-size application tables covers all fractional motors, with suggested application for each. Includes speed and torque data, wiring diagrams, etc, for every motor.

226A ELECTRICAL EQUIPMENT—Chicago Electric Co, 1318 W Cermak Rd, Chicago, Ill. 32-page booklet describes functions of company and lists pieces of rebuilt and used motor-generator sets, motors, air compressors, rotary converters, and other equipment. Brief descriptions of several pieces of equipment included with lists.

227 INDUCTION MOTORS—General Electric Co, Schenectady, N. Y. 4-page GEA1368C describes vertical hollow-shaft induction motors, specially designed for use with deepwell turbine pumps. Various parts of construction covered, plus outstanding features.

Here's How Flange-Jacks Work:
Remove opposite flange bolts, insert jaws of Flange-Jacks in holes and tighten. After removing other bolts, tighten down jackscrews together, separating flanges evenly until opening is large enough to remove old gasket and insert new one.

PATENT PENDING

Replace Gaskets EASILY with FLANGE-JACKS

NO HAMMERS, NO CHISELS, NO WEDGES

No Broken Flanges • No Damaged Faces • No Pipe Vibration • No Dangerous Sparks • No Long Shutdowns

HAS the job of opening flanges on pipe lines for the renewal of gaskets been a "tough one" for you in the past—usually difficult, often dangerous?

Your worries are at an end. Flange-Jacks—a new tool recently introduced by Garlock—makes the replacement of gaskets easy, quick, safe and economical. Keep your hammers, chisels and wedges for other jobs. Use Flange-Jacks and learn that a hard job can now be done with ease. Send for folder!

THE GARLOCK PACKING COMPANY
PALMYRA, NEW YORK

In Canada: The Garlock Packing Company of Canada Ltd., Montreal, Que.

GARLOCK

Manufacturers of Mechanical Packings and Gaskets Since 1887

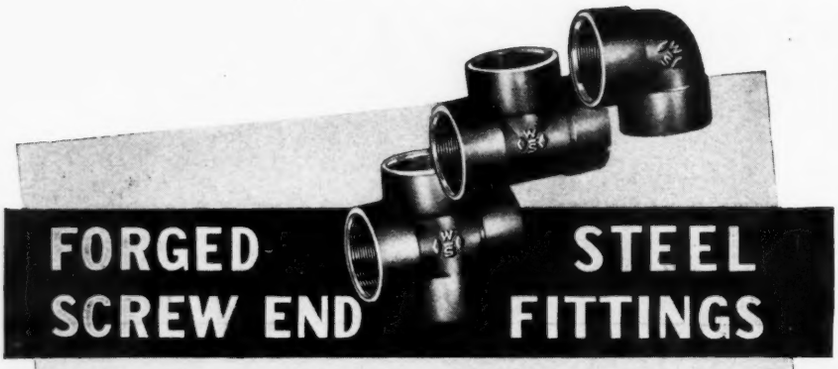
THE GARLOCK PACKING COMPANY, Palmyra, N. Y.
Please send descriptive folder on Flange-Jacks.

Name.....

Company.....

Address.....

POW. 12-40



FORGED STEEL SCREW END FITTINGS

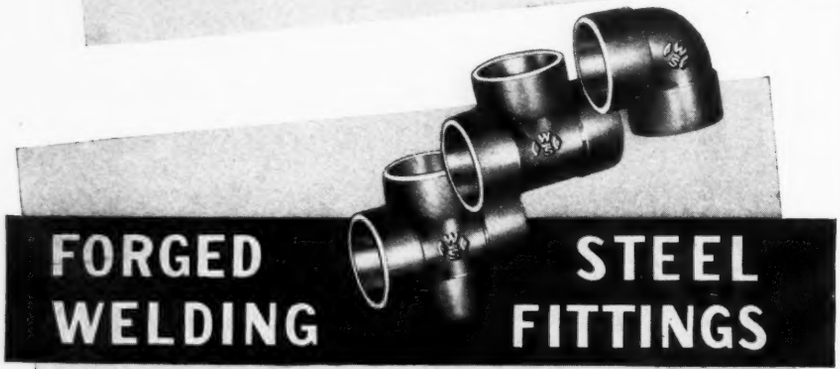
W-S Forged Steel Screwed Fittings are exceptionally strong and rugged. They are bored from solid forgings and threads are long, accurately cut and perfectly aligned. Uniform thickness of walls throughout assures high factor of safety. Long low bands extending beyond the last thread provide added reinforcement.

TYPES—90° Elbows, Tees, 45° Elbows, Crosses, Street Elbows, Laterlas, Couplings, Reducers, Bushings, Caps, Plugs, Unions.

SIZES—1/8" to 4" inclusive. Larger sizes can be made to order.

RATINGS—Made in three classes, 2000 C.W.P., 3000 C.W.P., 6000 C.W.P.

MATERIALS—Forged Carbon, Carbon-Molybdenum, Chromium-Molybdenum (4-6) and Stainless Steel (18-8).



FORGED STEEL WELDING FITTINGS

W-S Forged Steel Socket Welding Fittings are especially designed for welding and conform to tentative A. S. A. standards. They are easy to use. Just slip the fitting over the pipe end and make a clean outside the pipe weld. No tack welding — no special holding fixtures required.

TYPES—90° Elbows, Tees, 45° Elbows, Crosses, Couplings, Reducers, Caps, Flanged Unions.

SIZES—1/4" to 2" inclusive. Larger sizes can be made to order.

RATINGS—Made in four classes, 2000 C.W.P., 3000 C.W.P., 4000 C.W.P., 6000 C.W.P.

MATERIALS—Forged Carbon Steel and Carbon-Molybdenum Steel. Fittings of forged stainless steel Type 347, can be made to order.

WATSON-STILLMAN

Specifications, dimensions and prices on the complete line are listed in Bulletin A-3.

Write for your copy now—

THE WATSON-STILLMAN CO., ROSELLE, N. J.

228 MOTORS — Reliance Electric & Engrg Co, 1068 Ivanhoe Rd, Cleveland, Ohio. Single-page leaflet No. 220 describes Class 1 Group D explosion-proof motors, with cross-sectional drawings showing construction.

229 SYNCHRONOUS MOTOR—Electric Machinery Mfg Co, Minneapolis, Minn. Single-page leaflet describes and points out advantages of "packaged" synchronous motor, which has exciter and field-control unit mounted on motor frame.

230 MOTORS AND CONTROL—General Electric Co, Schenectady, N. Y. GED-856 is reprint of POWER's special section, by F A Annett, Associate Editor, entitled "Powered by D C", concerning construction, operation and maintenance of dc motors and control. Folder also shows construction photographs of G E Motors.

231 MOTORS & CONTROL—General Electric Co. Schenectady. N. Y. Booklet GED-847 entitled "How to select AC Motors and Controls", contains reprint, "Powered by AC" by F A Annett, reprinted from April, 1940, POWER, and lists and describes several G E motors and Controls.

232 MOTOR CONTROL — Electric Machinery Mfg Co, Minneapolis, Minn. 8-page publication No. 159 describes polarized-field-frequency automatic control for synchronous motors. Function and construction of control parts explained, and connections of typical control illustrated.

233 GEARMOTORS — Reliance Electric & Engrg Co, 1068 Ivanhoe Road. Cleveland. Ohio. 4-page catalog insert describes and illustrates Type S gearmotors, for alternating and direct current. Gives points to be checked by users to avoid confusion with variations in design.

234 SYNCHRONOUS MOTORS — General Electric Co, Schenectady, N. Y. GEA-246F describes "7500 series" high-speed synchronous motors, Type TS, 3-phase, and Type QS, 2-phase, including description of form B1 stator construction and form E1 stator specifications.

PAINTS & COATINGS

235 PAINTING — American Marietta Co, Chicago, Ill. 120-page maintenance painting handbook gives general and specific information concerning various surfaces which may be painted; includes discussion on conditions for painting, and lists, with characteristics, different Valdura paint products.

236 COATINGS — Dampney Co of America, Hyde Park, Boston, Mass. 8-page booklet No. 1290 describes Dampney protective coatings for preservation of metals, and equipment for applying. Includes brief descriptions of Apexior No. 1 and 3, and Styles E and F Powercoater for use in applying coatings. Complete instructions on how to apply coatings, as well as how to order same are given.

237 PAINTS—The Skybryte Co, 3125 Perkins Ave, Cleveland, Ohio. 16-page Catalog describes various paints made by company. Includes acid-resisting, alkali-resisting, general purpose aluminum, heat-resisting aluminum, and various other paint products.

238 COATINGS—Flexrock Co, 23rd & Manning Sts, Philadelphia, Pa. 4-page bulletin "Colorflex" describes and applies floor coating, which is enamel-like surfacing for wood or cement floors.

PIPING & FITTINGS

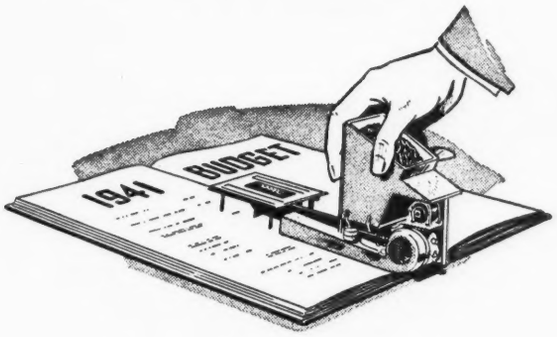
239 STEAM TRAPS—V D Anderson Co, 1935 W 96th St, Cleveland, Ohio. 40-page booklet, "How to Choose a Steam Trap." contains much technical information on selecting traps for various applications plus descriptions of various types of Anderson traps. Well illustrated with photos, drawings and tables.

240 INSULATED UNDERGROUND PIPE UNITS—The Ric-WiL Co, Cleveland, Ohio. Illustrated bulletin 4013 gives construction and installation views of insulated pipe units for underground steam lines.

241 PIPE THREADER—Beaver Pipe Tools, Inc, Warren, Ohio, 24-page bulletin No. 40 describes No. 71 pipe and

(*Continued on page* 128)

Put IRON FIREMAN *into your 1941 budget*



What other investment can earn so much for you? Decide now that in 1941 you will *modernize, Iron Fireman-ize* your boiler plant. Iron Fireman will step up operating efficiency to a new high, and at the same time earn an exceptional return on the investment.

For instance, *Bowser Pump,* Fort Wayne, Ind., is earning a 76% return on its Iron Fireman investment. *Massengill Laboratories,* Bristol, Tenn.-Va., is receiving a 39% annual return; and its 12 Iron Fireman stokers have given 50 years' combined service at a total service cost of only $29.20. *Patterson Mills,* Roanoke Rapids, N. C., is collecting annual cash savings amounting to 87% of its three Iron Fireman Powerams, with steam costs cut from 35 cents to 20.8 cents.

Let us make an Iron Fireman Engineering Survey of your plant. We cannot promise *you* such tremendous savings—unless your situation offers similar opportunities for improvement. But if you will authorize us to make a survey of your steam costs at our own expense, we will give you a conservative report showing what Iron Fireman *can* do. We will work in cooperation with your own consulting or plant engineer. The survey report can be incorporated, if you wish, in your 1941 budget recommendations. Send the coupon, and we will do the rest.

Above: The Iron Fireman underfeed stoker installed in the Manchester Biscuit Company, Fargo, N. D. This new stoker replaced an Iron Fireman unit which served continuously from 1926.

14 YEARS' SAVINGS

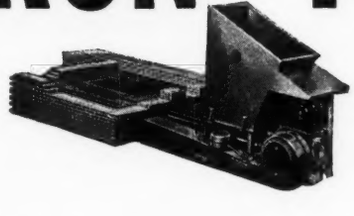
When hand-firing, the Manchester Biscuit Company of Fargo, N. D. was forced to operate two boilers. Lignite was burned during most of the year, but during the winter months it was necessary to burn more costly eastern coal (in both boilers) in order to carry the load.

Since Iron Fireman took over the job 14 years ago, the company has been able to handle the entire load on one boiler—with inexpensive lignite being fired the year 'round. Production has been doubled, but no difficulties have been encountered.

Says President O. B. Skadland: "We like our Iron Fireman very much, and would not hesitate to recommend it to anyone, praticularly with equipment similar to ours, and for use with lignite coal."

IRON FIREMAN

Automatic Coal Stokers



IRON FIREMAN MANUFACTURING CO., Portland, Ore.; Cleveland; Toronto.

Mail to 3380 West 106th St., Cleveland, Ohio

☐ See us about making an Iron Fireman Engineering Survey of our steam costs.

Send ☐ Industrial Power Catalog
☐ Commercial Heating Catalog.

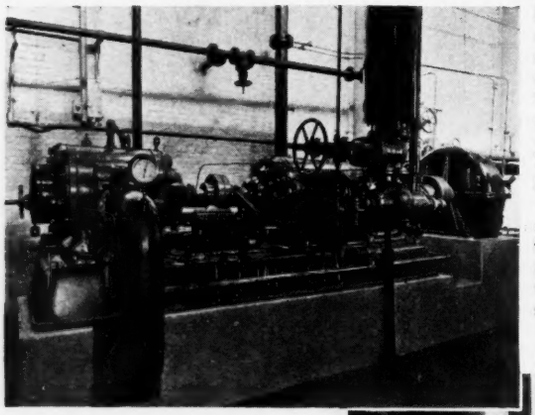
Name_____

Address_____

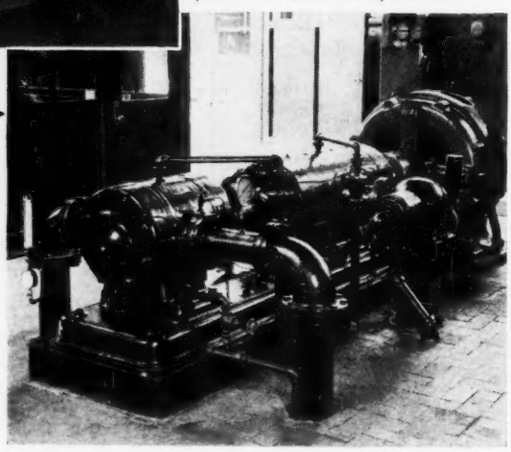
FOR 100-LB. PRESSURE

Fuller Rotary COMPRESSORS

Facts concerning Fullers . . . available for 80 to 125-lb. service. Performance records prove their worth.



Left: 1775 C.F.M. actual free-air delivery, 100-lb. pressure, Two-stage Rotary Compressor, installed in a plant in New York State. This machine, since installed, has had two comparatively long, 24-hr. per day runs. The first of these runs covered 5,668 hours, and the second 12,144 hours, with the exception of less than an hour shut-down for inspection during this latter period. The remainder of the time this machine has been installed, it has operated approx. 16 hours per day, whenever the plant has been in operation.



Right: 685 C.F.M. actual free-air delivery, 100 lb. pressure, Two-stage Rotary Compressor, installed in a steel mill in West Virginia. This machine was installed April, 1939, and placed on continuous 24-hour per day service. As a result of the satisfactory performance of this unit, eight additional Fullers have been ordered.

Write for Bulletin C3-A.

FULLER COMPANY

CATASAUQUA, PENNSYLVANIA

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San Francisco: 320-321 Chancery Bldg.

C-48

Fuller

FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS

ROTARY AIR COMPRESSORS AND VACUUM PUMPS

ROTARY FEEDERS AND DISCHARGE GATES

AIR-QUENCHING COOLERS · · · · BIN SIGNALS

Monel for pump parts in applications where there is need for high resistance to corrosion, wear, pitting, or scoring. Bulletin was prepared with the assistance of S A Tucker and F A Annett, Associate Editors of POWER.

260 PUMPS—Lawrence Pump & Machine Corp, 371 Market St, Lawrence, Mass. Bulletin 208-2 describes standard dredging pumps designed for general dredging service, for pumping sand and gravel, pumping of ashes and cinder, and other applications where pump handles mixtures of water and abrasives. Tables give capacities, speeds and power requirements.

261 CENTRIFUGAL PUMPS—Warren Steam Pump Co, Inc, Warren, Mass. 6-page Bulletin 225-1 describes single-stage, double-suction centrifugal pumps, types DB and DS. Includes rating table and dimensions.

262 VACUUM PUMPS—Warren Steam Pump Co, Inc, Warren, Mass. Bulletin 226-I presents ratings, dimensions, and general descriptive data on steam heat vacuum pumps.

263 PUMPS — American Manganese Steel Div, 389 E 14th St, Chicago Heights, Ill. Bulletin 940 covers complete line of horizontal- and vertical-shaft centrifugal pumps from 3-4 to 6 in. Includes design principles and construction features, ratings, capacities.

264 PUMPS—Fairbanks, Morse & Co, Chicago, Ill. 12-page bulletin No. 5135 describes F. M. rotary pumps, how they work, construction features, features of single-pumping and multiple units. Page of engineering data included.

265 PUMPS—Warren Steam Pump Co, Inc, Warren, Mass. 20-page catalog covers complete line of centrifugal, simple and duplex pistons, and plunger pumps. Also includes vacuum pumps.

266 PUMP GOVERNORS — Foster Engineering Co, 109 Monroe St, Newark, N. Y. 16-page catalog contains information on Foster pump governors. Includes applications, features, operation, installation, dimensions, and weights of pump governors for constant, and excess-pressure service.

267 PUMPS—A R Wilfley & Sons, Box 2330, Denver, Colo. 6-page folder illustrates and describes Model "AB" and "AC" acid pumps. Outline dimensions of both models presented in table form, and various parts explained.

268 PUMPS—Worthington Pump & Machinery Co, Harrison, N. J. 4-page bulletin No. W-341B7 describes vertically split, single-stage volute centrifugal pumps for oil refinery service. Capacities, heads, and speeds included.

269 PUMPS—Fairbanks, Morse & Co, 600 South Michigan Ave, Chicago, Ill. 16-page bulletin No. 5710 illustrates and describes new line of "Angleflow" pumps in both vertical and horizontal types in which hydraulic stream flow through impeller is at an angle to axis of rotation.

270 CHEMICAL PUMPS—Milton Roy, Philadelphia, Pa. Bulletin No. 1039 describes self-contained, single- and multiple-unit, high-pressure chemical pumps and proportioners, for handling variety of acids, alkalis, oil and chlorine solutions, etc.

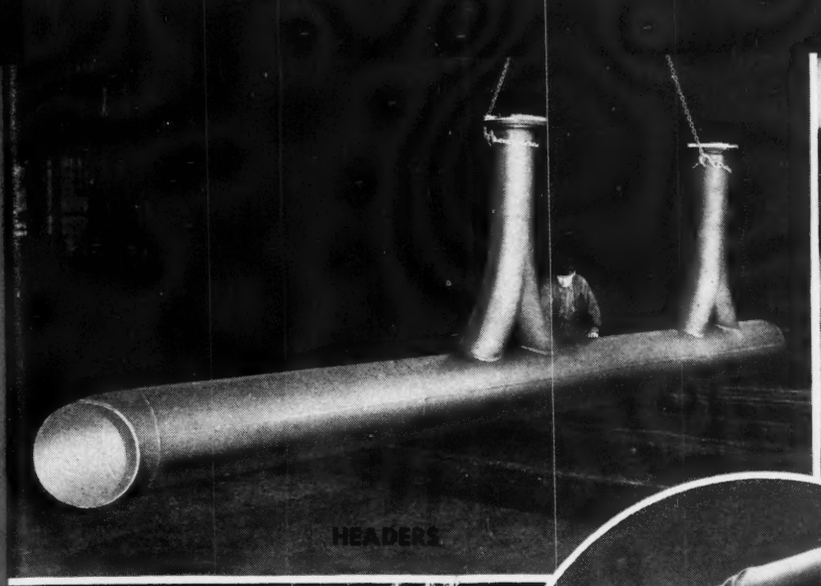
271 PUMPS—Peerless Pump Co, 305 West Ave 26, Los Angeles, Calif. "100,000 Raindrops from Underground for 1c" shows open section views of Peerless pumps, oil- and water-lubricated.

272 PUMPS—Taber Pump Co, 286 Elm St, Buffalo, N. Y. 12-page booklet includes rating tables, descriptions and other information concerning Taber general-purpose and sump pumps. Cross-sectional drawings show typical applications.

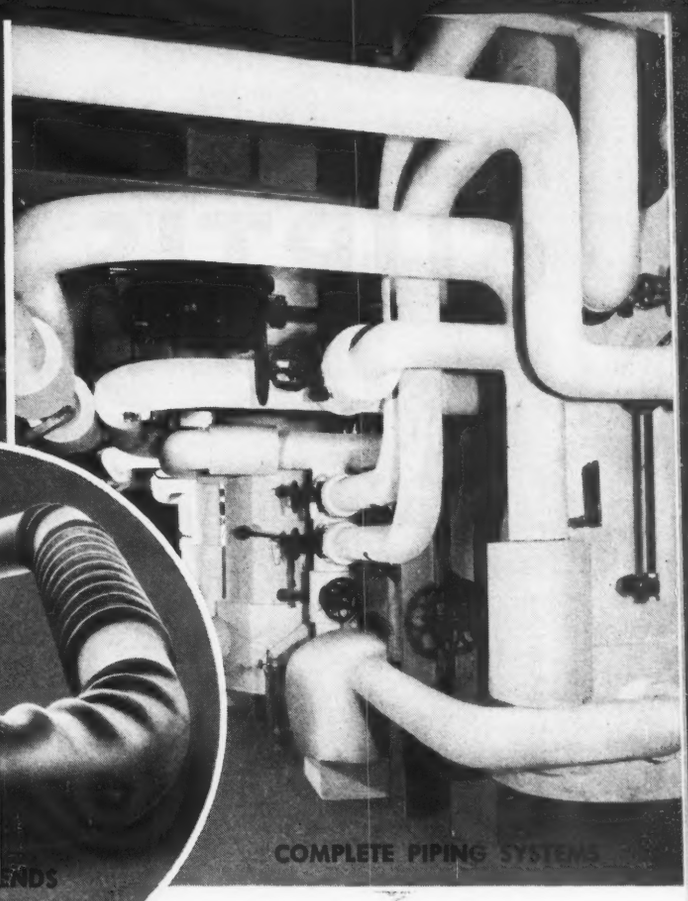
273 CENTRIFUGAL PUMPS — Fairbanks, Morse & Co, 600 S Michigan Ave, Chicago, Ill. Descriptions, typical applications, specifications, and pump selection tables make up Bulletin 5810D, on single-stage split-case centrifugals.

274 PROPELLER PUMPS—S Morgan Smith Co, York, Pa. 20-page bulletin No. 142 describes fixed-blade and automatically-adjusted blade, axial-flow propeller pumps and gives their performance characteristics, typical settings, head and capacity ratings, etc.

275 PUMPS—Worthington Pump & Machinery Corp, Harrison, N. J. Bulletin W-322-B1D on balanced Monobloc centrifugal pumps, Type G, 2-stage. Features and applications presented with gpm ratings.

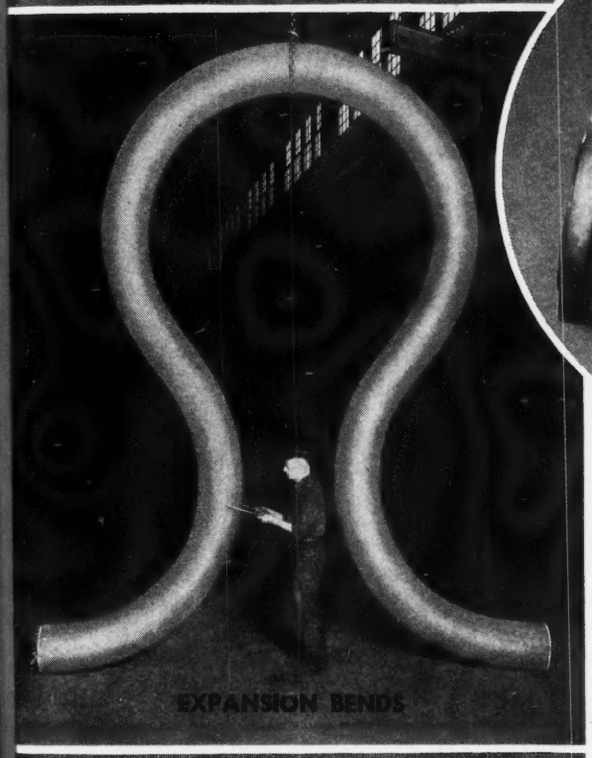


HEADERS

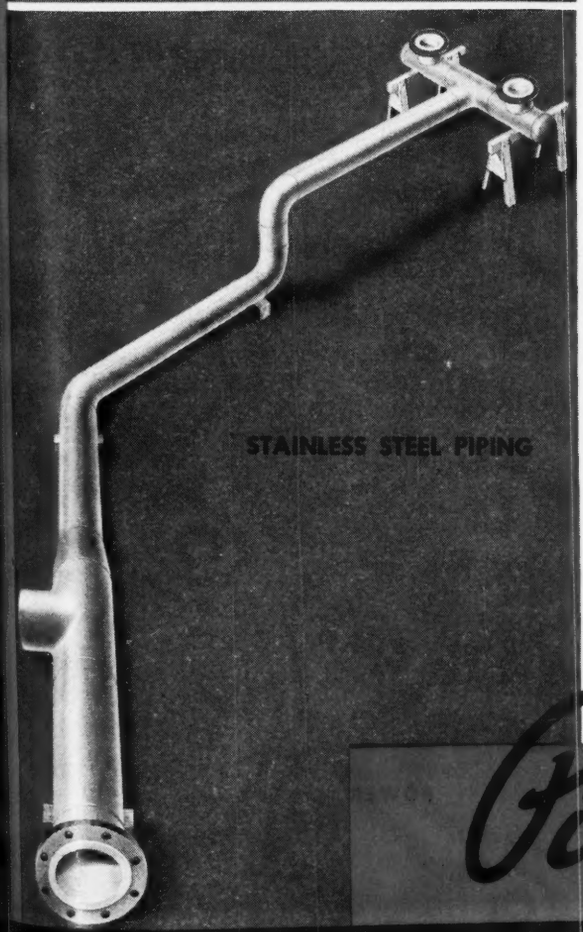


COMPLETE PIPING SYSTEMS

CREASED BENDS
CORRUGATED PIPING



EXPANSION BENDS



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PITTSBURGH Piping has had wide experience in fabricating all types of piping for central stations, industrial and process plants. This assures proper interpretation of customer's specifications and strict compliance with code and insurance company requirements. This work is performed by skilled workmen under competent supervision, using modern equipment for bending, Van Stoning, welding, machining, heat treating and other necessary operations. A specially trained field organization has been developed for directing the installation of complete systems or extensions to existing systems in any part of the country. By maintaining close cooperation between shop and field, materials are delivered as required and erection proceeds rapidly and efficiently.

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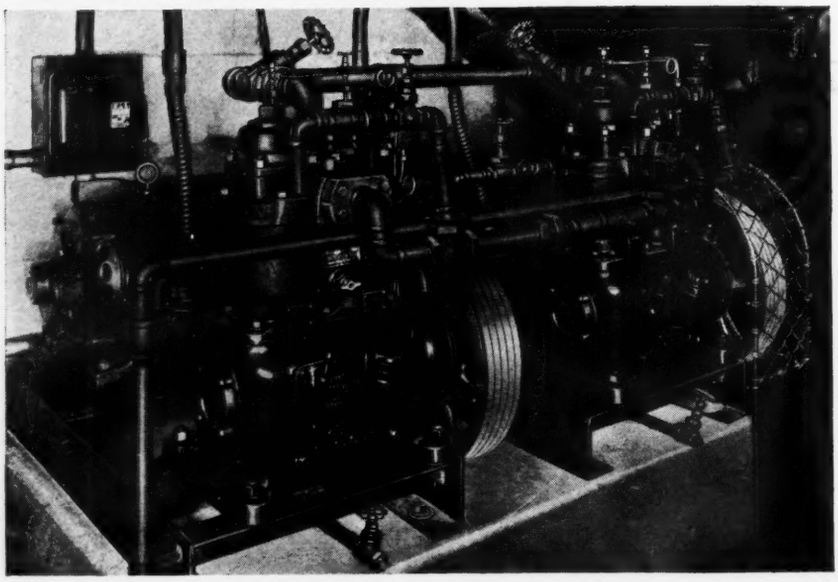
Pittsburgh Piping

Increase Production, Lower Costs with

CURTIS AIR COMPRESSORS and AIR HOISTS—



Timken Roller Bearings
Carbon-free Disc Valves
Centro-ring Oiling
Fully enclosed

Curtis Model "C" Compressors

Bore and stroke	No. of cylinders	R.p.m.	Displ. cu. ft. min.	Max. press	Hp. @ 100 lb.
4½x3¾	2	480–870	25– 53	150 lbs.	4.5–11.5
4½x4	2	480–870	29– 64	150 lbs.	5.1–10.4
5¼x4	2	480–870	40– 87	150 lbs.	6.2–14.3
5½x5	2	480–870	55–120	150 lbs.	9.3–20.5
6½x5	2	480–870	77–167	150 lbs.	14.0–30.7
5½x5¼	V-4	480–870	116–252	150 lbs.	19.5–43.0
6½x5¼	V-4	480–870	161–352	150 lbs.	29.4–64.2

For prices and dimensions send for Bulletin C-4-C

CURTIS AIR HOISTS

Power lifting up to 10 tons at a cost no greater than chain block. Laborer can spot accurately. Abuse-proof, simple, rugged construction. Long life with extremely low up-keep.

Write for special applications in the brewing industry, complete details and prices.

Diameter hoist, ins.	Capacity at 80 lbs. pressure	Cu. ft. of free air to lift max. load 1 ft. at 80 lbs. pressure	Weight of hoist 4-ft. lift		Weight each additional ft.
			Net lbs.	Crated	
4	860	.54	80	105	11
5	1370	.84	130	150	20
6	1960	1.22	160	200	24
7	2700	1.73	220	240	29
8	3510	2.24	250	300	36
9	4470	2.85	320	360	42
10	5500	3.29	390	420	50
12	7990	5.06	500	580	60
14	10870	7.13	700	850	75
17	16080	10.10	950	1200	90
19	20150	12.50	1150	1500	100

CURTIS HYDRAULIC CYLINDERS

- First cost is low.
- Instant accurate control.
- Inexpensive to operate.
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- Installation is simple.
- Regular shop air lines used.
- Anyone can operate.
- Safety oil-locked at all heights.
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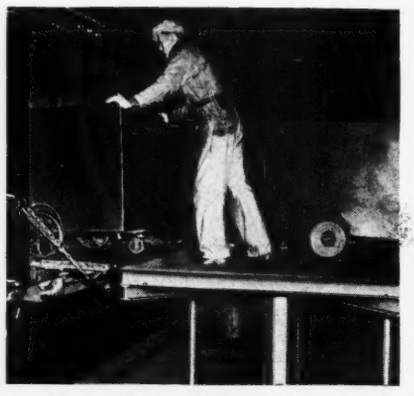

CURTIS PNEUMATIC MACHINERY CO.

1934 KIENLEN AVENUE • ST. LOUIS, MISSOURI

ST. LOUIS — NEW YORK — CHICAGO — SAN FRANCISCO — PORTLAND

276 ROTARY PUMPS—Quimby Pump Co, Thomas St, Newark, N. J. 8-page bulletin describes Rotex pumps, with sectional views showing bearings, tables giving dimensions, and selection chart for estimating purposes.

277 PUMP PRIMING — De Laval Steam Turbine Co, Trenton, N. J. Paper entitled "Automatic Priming Systems for Centrifugal Pumps", by F S Broadhurst, is reprint of original article. Describes automatic priming system for centrifugal pumps, which keeps pump always filled with water.

278 ROTARY PUMPS—Viking Pump Co, Cedar Falls, Iowa. Bulletin 2500-40 illustrates and describes new line of Viking rotary pumps for heavy-duty service.

279 PUMPS—Allis-Chalmers Mfg Co, Milwaukee, Wis. Catalog section B6105 covers 2-stage, S S Multi-pumps, centrifugal. Construction features, dimensions and capacities included in tables.

280 PUMPS—De Laval Steam Turbine Co, Trenton, N. J. Catalog L-32-A illustrates and describes De Laval-IMO oil pumps, designed for handling various grades of fuel oils, heavy crude oils, lubricating and hydraulic oils in capacities above 30 gpm.

REFRACTORIES

281 INSULATING FIREBRICK—A P Green Fire Brick Co, Mexico, Mo. 8-page folder contains technical data on A P Green line of insulating firebrick. Page two contains helpful data on how to select. Profusely illustrated, 2 colors, many charts and diagrams.

282 INSULATING FIREBRICK — Babcock & Wilcox Co, 85 Liberty St, New York, N. Y. Bulletin R-2-G includes an exposition of the advantages of insulating firebrick in general, and their application to boiler and industrial furnaces.

283 REFRACTORIES — Mexico Refractories Co, Mexico, Mo. 16-page illustrated booklet in 2 colors shows how Mexico refractories are produced and describes the historical background of the fire clays used by this company.

284 REFRACTORIES — General Refractories Co, Philadelphia, Pa. "World-Wide Refractories Service," 48-page booklet, has 65 illustrations plus 30 drawings of brick shapes and sizes.

285 REFRACTORIES — The Carborundum Co, Niagara Falls, N. Y. 76-page illustrated booklet covers silicon-carbide, fused-aluminum-oxide, "Mullite" and aluminum-silicate refractories. Engineering reference section includes arch formulas, circumferences and areas of circles for given diameters.

286 HIGH-TEMPERATURE BONDING MORTARS—Harbison-Walker Refractories Co, Pittsburgh, Pa. 15-page illustrated booklet, in 3 colors, covers characteristics of various high-temperature bonding mortars.

287 BONDING MORTAR—A P Green Fire Brick Co, Mexico, Mo. 4-page bulletin gives advantages of "Sairset," air-setting, high-temperature bonding mortar, Comparisons between this and other mortars illustrated.

288 REFRACTORIES—Atlas Lumnite Cement Co, Chrysler Bldg, New York, N. Y. 24-page bulletin "Refractory Concrete" describes refractory concrete made with "Lumnite".

289 REFRACTORIES — General Refractories Co, Philadelphia, Pa. 4-page bulletin No. 209 covers Sillimanite brick, cement and plastic refractories, and shows results of tests made with three different cements.

290 FIREBRICK CEMENT — Armstrong Cork Co, Lancaster, Pa. 6-page booklet describes Armstrong cements for laying and facing insulating firebrick. Different types of cements described for various applications. Tables show chief characteristics of cements and insulating firebrick.

291 FIREBRICK — Armstrong Cork Co, Lancaster, Pa. 8-page booklet describes insulating firebrick for all types of heated equipment. Specifications for applying given, and chief characteristics of different brands presented.

292 REFRACTORIES — Mullite Refractories Co, 2525 Clyburn Ave, Chicago, Ill. 50-page catalog describes "Shamva Mullite", and concerns itself with typical applications for boilers, furnaces, etc. Complete line of air- and heat-setting cements also described.

"It pays us to use GULF QUALITY LUBRICANTS--

--our records prove it!" ...says this Chief Engineer

This large Diesel Plant is making an outstanding record of economical operation with Gulf's higher quality lubricants.

"GULF PERIODIC CONSULTATION SERVICE *helps us keep maintenance costs down"*

"WE feel sure that Gulf's higher quality lubricants have played a big part in the outstanding operating record we've made in our plant," says this Chief Engineer. "Our big Diesels are in top-notch condition—our maintenance costs are lower than they have ever been."

Here's one important reason why you can expect better results with Gulf Diesel Lubricating Oils: They are specially refined to withstand high temperatures, contamination with fuel and moisture, and constant churning in the presence of air. *And* more than 50 leading manufacturers have approved Gulf Diesel Oils for lubrication of the engine they build. Call in a Gulf Engineer—ask him to explain GULF PERIODIC CONSULTATION SERVICE and how it can help you get more lubrication value per dollar. Write or phone your nearest Gulf office today.

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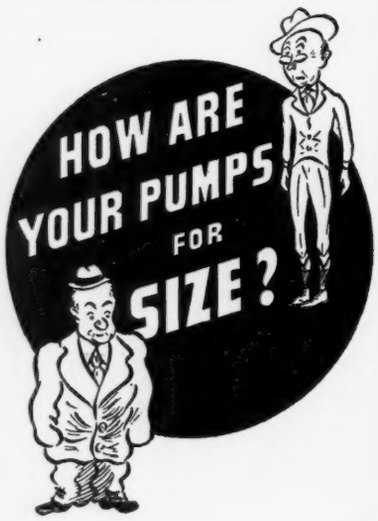
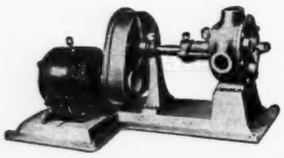


For the sake of the pump —fit the pump to the job. That's a good rule to remember regardless of what you're pumping. If your pumps are NOT large enough, they're wasting time . . . if your pumps are TOO large, they're wasting both power and motion. Viking's complete line of standard "stock" rotary pumps ranges from 1/2 GPM to 1,050 GPM . . . it includes portable and stationary models . . . presents a wide selection of special mountings and drive arrangements. The next time you need a certain size pump to fit a certain size power pumping job, write, wire or phone Viking.

Write for Bulletin 802-35



LOOK FOR THIS TRADE MARK — THE SIGN OF A GENUINE VIKING!

VIKING PUMP CO.

CEDAR FALLS, IOWA

293 FIREBRICK—A P Green Firebrick Co, Mexico, Mo. 4-page bulletin describes Empire firebrick, giving photos showing typical applications. Types of brick available also given.

294 REFRACTORY CEMENT—Babcock & Wilcox Co, 85 Liberty St, New York, N. Y. Bulletin R-19 describes B & W insulating concrete mix, used to form rammed monolithic or cast shapes, simply by adding water.

REFRIGERATING EQUIPMENT

295 GAS PURGER—Armstrong Machine Works, 812 Maple St, Three Rivers, Mich. 8-page bulletin "New Ways to Cut Refrigeration Costs" describes Armstrong purger, giving instruction on operation, installation recommendations, and users' testimonials. Gives brief description of Armstrong "High-Side" Float.

296 COOLING SURFACE—John J. Nesbitt, Inc, Holmesburg, Philadelphia, Pa. 4-page folder describes advantages of new type cooling surface, giving construction details of same.

297 COOLING CONTROLS — Sarco Co, 183 Madison Ave, New York, N. Y. Sarco File No. 197 covers all types of cooling controls made by company. These include recirculating controls, throttling controls, and refrigeration controls, all operating on Sarco liquid-expansion system.

298 UNIT COOLERS—Trane Co, La-Crosse, Wis. 76-page catalog No. D-303-2 gives complete descriptions of all unit coolers and conditioners made by company. Includes capacity data, as well as cooling-coil capacity and heat-transfer properties.

299 REFRIGERATION UNITS—Worthington Pump & Machinery Corp, Harrison, N. J. Bulletin C-1100-B-7 covers Worthington-Carbondale refrigeration units, 75 to 125 hp, for Freon-12. Sectional drawings of several models included.

RUST- & SCALE-PREVENTING EQUIPMENT

300 SCALE PREVENTION—Activator Process Sales Co, 501 South Marengo Ave, Alhambra, Calif. 8-page bulletin describes Activator process and application for preventing scale in the generation of steam. Also gives applications of the process in scale prevention for cooling towers, water jackets.

301 SCALE REMOVER — American Sand-Banum Co, 9 Rockefeller Plaza, New York, N. Y. 16-page booklet describes Sand-Banum compound, giving advantages, features, and operating characteristics.

302 SCALE AND RUST REMOVAL —Oakite Products, Inc. 22 Thames St, New York, N. Y. Third edition 20-page booklet describes Oakite Compound No. 32 for safely removing water scale and rust from lube-oil and jacket-water coolers, feed-water heaters, surface condensers, diesel and gas-engine cooling systems, and compressors.

303 SCALE PREVENTION — Activator Process Sales Co, 501 South Marengo Ave, Alhambra, Calif. 4-page bulletin describes APSCO scale-prevention service, giving points of efficiency, method of testing performance, and general description of operations.

305 LIME AND RUST REMOVER—American Chemical Paint Co, Ambler. Pa. 6-page leaflet describes Clorodine lime and rust remover, which is inhibited muriatic acid solution. Method of cleaning several types of equipment described.

306 RUST-PROOFER — American Chemical Paint Co, Ambler, Pa. 4-page booklet gives method of preparation of rust-proofer, together with application instructions. Also presents brief notes about other company products, including Rodine, Clorodine, Cuprodine, Elastic primer, Lithoform, Deoylyte, Deoxidine, and Kemick.

SPEED REDUCERS

307 SPEED CONTROLS—Reeves-Pulley Co. Columbus, Ind. 8-page folder covers Reeves line of pulleys, giving typical applications and explaining how to get rid of bottle-necks.

308 SPEED REDUCERS—Philadelphia Gear Works, Erie Ave & G

. . . WORTH saving . . . in assembly or service adjustments! In machine tool assembly (where *accuracy* is paramount), Laminum shims not only reduce labor . . . they afford a precision which makes older methods a costly luxury. Simply *peel* known gage laminations from the solid brass shim!

Laminum shims cut to specifications. Stock shim materials sold by mill supply dealers.

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Troubled with air binding, dribbling, slow venting, unreliable drainage or too frequent maintenance of your steam traps? Let CRYER show you how you can cure steam traps headaches, save steam, step up steam line efficiency.

CRYER INVERTED BUCKET STEAM TRAPS are solving steam trap troubles in scores of plants. They operate properly under all conditions, insure mechanically controlled quick venting, are positive in action at all times. The baffle plate prevents sudden surges from interfering with normal operation.

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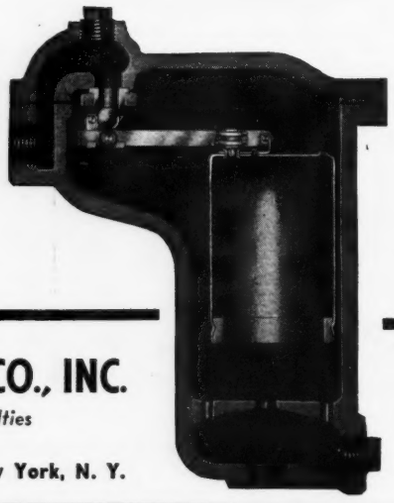

CRYER TRAP & VALVE CO., INC.
Manufacturers of Steam Specialties for more than 40 years
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St. Philadelphia, Pa 64-page catalog covers line of single- double- and triple-reduction herringbone speed reducers.

STOKERS

309 STOKERS—U. S. Machine Corp. Lebanon, Ind. 4-page bulletin covers Winkler automatic stokers, self-feed models 20, 30, 40, 55, 75, and describes these industrial units with burning capacities from 200 to 750 lb of coal per hr for bituminous coal and lignite.

310 STOKERS—Wm Bros Boiler & Mfg Co, Minneapolis, Minn. 10-page illustrated folder describes the Bros "Super-Spred" rotor-spreader stoker for feeds up to 4000 lb per hr per unit.

311 STOKERS—Detroit Stoker Co, General Motors Bldg, Detroit, Mich. 24-page bulletin describes Detroit Unistoker, showing sectional views and typical application in several plants. Photographs show stokers being assembled before shipment.

312 STOKERS—Detroit Stoker Co., General Motors Bldg., Detroit, Mich. 12-page bulletin No. 550 covers complete line of Detroit stokers, including Unistoker, Lostoker, triple-retort stoker, Rotostoker, and multiple-retort.

313 STOKERS—Whiting Corp, Harvey, Ill. 12-page bulletin No. 222 describes Whiting stokers, lists advantages, users' recommendations and experiences. Various models.

314 STOKERS—Iron Fireman Mfg. Co, 3295 W 106th St, Cleveland, Ohio. Catalog 7060 describes Iron Fireman pneumatic spreader stoker, with operating details, installations, diagrams.

315 STOKERS—Canton Stoker Corp, 741 Andrew Pl, Canton, Ohio. 8-page bulletin No. 203 describes Vulcan type stoker, showing assembly, cross-sectional views, material specifications and specification outline.

SWITCHES, CIRCUIT BREAKERS, ETC

316 CAPACITORS — Westinghouse Elect & Mfg Co, E Pittsburgh, Pa. 28-page Application Data 49-065 is intended as a permanent reference manual for electrical engineers. Containing theory, formulas, tables and charts, it tells how and where to apply capacitors.

317 OIL CIRCUIT BREAKERS—Allis-Chalmers Mfg Co, Milwaukee, Wis. Bulletin B-6122 describes Type OX-110 oil circuit breakers for moderate-capacity applications on outdoor distribution service.

318 ELECTRICAL EQUIPMENT — Westinghouse Electric & Mfg Co, East Pittsburgh, Pa. 50-page "Quick Selector" catalog No. 30-000 is designed to help user of electrical apparatus select right equipment for motor or lighting circuit. Includes safety switches, circuit breakers, multibreakers, motor-control devices, etc.

319 ELECTRICAL PRODUCTS — Colt's Patent Fire Arms Mfg Co, Hartford, Conn. Catalog No. 3 presents listing of entire line of Colt products, including safety switches, Multibreakers, service equipment, fuses, etc, and listing of sizes "O" and "1" motor control units.

320 CIRCUIT BREAKER—I-T-E Circuit Breaker Co, 19th & Hamilton Sts, Philadelphia, Pa. 35-page catalog No. 5001 describes and illustrates uses of Type ET circuit breaker, used mainly for load centers, power panels, etc.

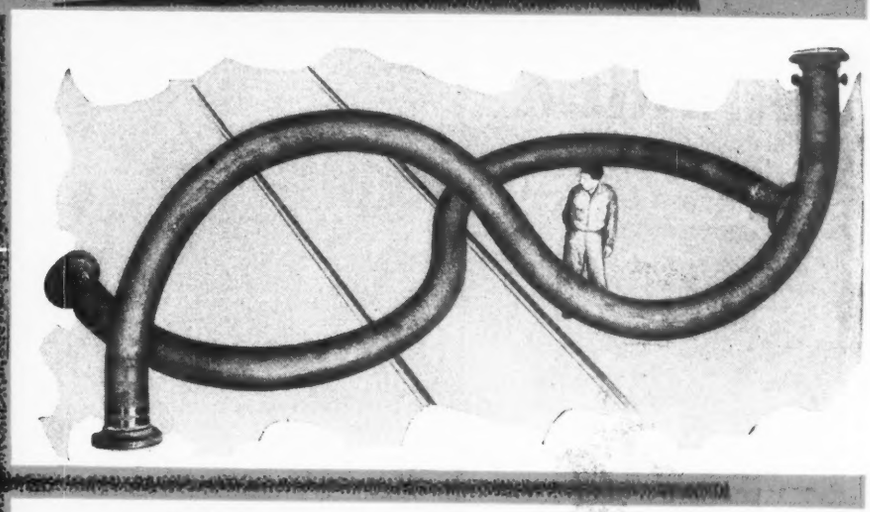
321 CIRCUIT BREAKERS—1TE Circuit Breaker Co, 19th & Hamilton Sts, Philadelphia, Pa. 16-page illustrated booklet 3906 describes Type LG Circuit breakers.

322 CIRCUIT BREAKER — Roller-Smith Co, 1766 West Market St, Bethlehem, Pa. Catalog 1230 illustrates and describes low-voltage metal-enclosed air-circuit-breaker switch-gear.

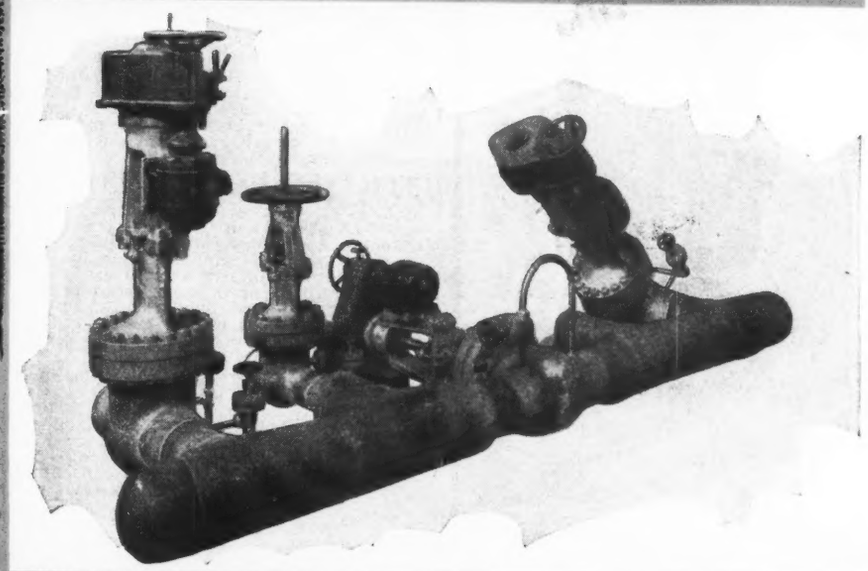
323 SWITCHBOARD INSTRUMENTS General Electric Co, Schenectady, N. Y. Complete line of rectangular switchboard instruments is described in GEA-1758B. These include ac ammeters, voltmeters, wattmeters, power-factor meters, frequency meters, dc ammeters, and voltmeters.

324 TRANSFORMERS—Allis-Chalmers Mfg Co, Milwaukee, Wis. Bulletin B6043 covers Chlorextol-filled transformers. Outlines savings that can be obtained by this type transformer, and lists several advantages.

MIDWEST *Alloy* PIPING



14" O.D. Chromium-Molybdenum pipe bends with Van Stone laps. Entire bends annealed after fabrication.



Carbon-Molybdenum header stress relieved in furnace before welding on valves which were welded by preheating and stress relieving with induction method.

PRESSURE piping users have found that alloy tubing presents many problems and difficulties not encountered when low carbon steel materials are used. Some have learned by bitter experience that the utmost care must be exercised in selecting a fabricator . . . one who has wide experience in the special manufacturing procedures required by the various alloys. It is also essential that the fabricator's welders be skilled on welding alloy tubing . . . and that he have the heat treating furnaces and other special equipment needed.

Each of the three Midwest plants is thoroughly familiar with all the "do's" and "don'ts" peculiar to the fabrication of alloy tubing. Midwest has welders qualified on the alloys . . . and Midwest has the special equipment so essential to the successful fabrication of alloy tubing.

Whenever you need alloy piping, you will find it definitely advantageous to get in touch with the nearest Midwest office.

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TURBINES

325 TURBINE—Westinghouse Electric & Mfg Co, East Pittsburgh, Pa. 28-page illustrated booklet No. B-2230 describes general-purpose impulse turbines for condensing and non-condensing service. Sizes from 5 to 1500 hp described, inlet steam pressures to 600 lb and temperatures to 750 F.

326 TURBINE-GENERATOR — Elliott Co, Jeannette, Pa. 32-page illustrated booklet H-10 describes steam turbine-generators of condensing, non-condensing, and extraction types. Also discusses arrangement of turbine-generator-condenser unit.

VALVES

327 VALVES & PIPE FITTINGS—Kennedy Valve Mfg Co, 1104 E Water St, Elmira, N. Y. Illustrated Catalog 63, 240 pages, includes complete information on bronze and iron-body valves, standard bronze and malleable-iron screwed fittings, standard cast-iron flanged fittings and flanges.

328 SOLENOID VALVES—Automatic Switch Co, 41 E 11th St, New York, N. Y. Circular 100 describes various types of shut-off valves, pilot valves and special solenoid-operated valves.

329 THERMOSTATIC VALVES — Thomas A. Edison, Inc, Instrument Division, West Orange, N. J. Bulletins describe several types of packless thermostatic valves, with 2 deg operating differential. Available for use up to 150 lb steam pressure.

330 VALVES—S Morgan Smith Co, York, Pa. 8-page booklet No. 144 draulic service. Capacity chart, presented, together with several typical applications.

331 VALVES—Leslie Co, Lyndhurst, N. J. Ring-bound, stiff-covered bulletin describes and illustrates all types of equipment made by company, including pressure-reducing valves, pressure controllers, pump governors, temperature regulators, and strainers.

332 VALVES—Henry Vogt Machine Co, Louisville, Ky. 8-page folder describes Vogt drop-forged-steel gate valves, covering both flanged-end and screw-end valves. Specifications of various units included.

333 PRESSURE-REDUCING REGULATORS—Foster Engrg Co, 109 Monroe St, Catalog 70, Bulletins 1-A, 2 and 5, describe and illustrate pressure-reducing regulators for steam, water or air, and for steam, liquids, air or gases, respectively. Bulletin 1-A covers Type 37-G2 auxiliary or pilot operated units; Bulletin 2 includes Types 37-A1, 39-B1, 37-A2, 39B2, 37-A9 and 39-B9; and Bulletin 5 describes Foster U-Type regulators.

334 VALVES—C F BRAUN Co, Inc, Alhambra, Calif. 8-page bulletin 3301 describes and illustrates Braun streamline bypass valves, giving general features, different arrangements, construction features, parts, and dimensions. Each type is shown both in cutaway form, with technical information on facing pages.

335 VALVES—Fairbanks Co, 397 Lafayette St, New York, N. Y. 4-page leaflet describes Fairbanks bronze gate valves, with cutaway drawings showing construction.

336 VALVES — Jenkins Bros, 80 White St, New York, N. Y. 30-page booklet presents power hookups in conjunction with descriptions of Jenkins valves. Depicts story of "From Good Power Hookups to Good Valve Practice."

337 VALVES—J H H Voss Co, 408 Concord Ave, New York, N. Y. 4-page folder illustrates describes, and gives advantages of Voss valves for compressors. Also presents engineering experience of J H H Voss.

338 VALVES—Connelly Iron Sponge & Governor Co, 3154 S California Ave, Chicago, Ill. 4-page bulletin No. 301-B-2 describes Connelly back-pressure valves, including dimensions, illustrations and cross sectional drawings.

339 GATE VALVES—Lunkenheimer Co, P O Box 360 Annex Station, Cincinnati, Ohio. 8-page circular in two colors shows complete line of "Kingclip" valves, with drain channels and bronze threaded bushing in bonnet, for steam, oil, gas, air, water and gasoline.

340 REGULATORS — Schade Valve Mfg Co, 2527 N Bodine St, Phila-

"PBH" Vertical Water Gauges

Quick-Closing

Opened or shut by less than a quarter-turn. If a glass breaks, the gauge is shut off by a pull of the chain. No scalds; no burns. Steam and water passages are ample and have no "pockets" to collect sediment. Body is extra heavy and of best steam metal. All valve stems packed with asbestos graphite rings—nuts are large to accommodate ample size rubber washers. All Double Extra Heavy water gauges have monel metal seats and valve stem loose discs. All extra heavy water gauges have monel metal loose disc valve stem tips. All gauges can be equipped with an attachment which shuts off both water and steam automatically should the gauge glass accidentally break.

For the complete PBH line of Power Plant Equipment and Instruments, send for Bulletin R-34

The PAUL B. HUYETTE CO., Inc.

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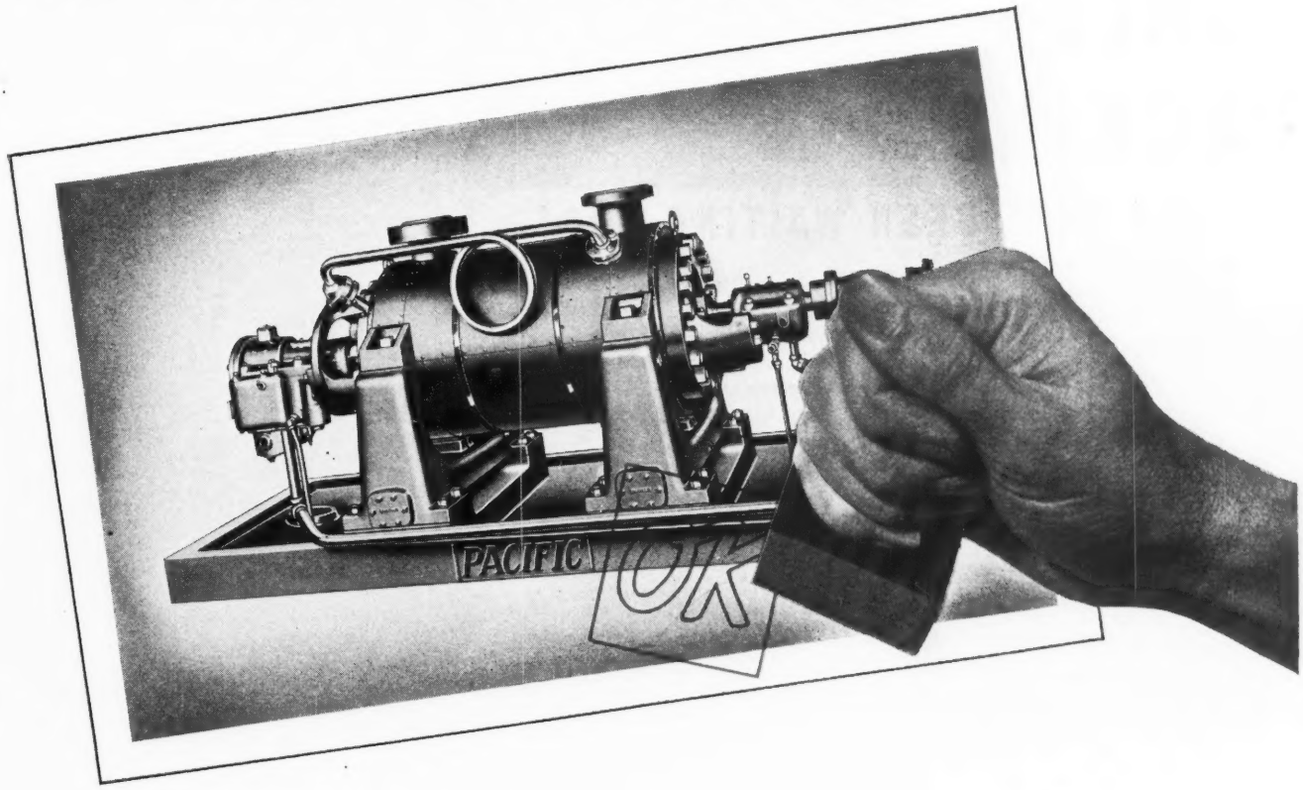
403 N. Broad St., Philadelphia, Pa.

APPROVED BY A BIG MID-WEST UTILITY FOR POWER PLANT OPERATION



The installation of Pacific Boiler Feed Pumps by a leading Mid-West Utility stamps approval on Pacific Pump design and construction.

With steam boiler operations increasing to 1000 degrees F., and pressures rising to 1700 p.s.i., Pacific Pump Works pioneered in designing and building pumps that would meet these once impossible conditions.

Hundreds of Pacific Boiler Feed and Hot Oil Pumps have been installed in the past ten years. They range in capacity from 50 to 2700 g.p.m., working against differential pressures up to 2500 pounds per square inch, and at temperatures up to 850° F.

Installations are now operating in Europe, Asia, North and South America, all so completely satisfactory that they have produced many repeat orders and won new customers by their outstanding performance.

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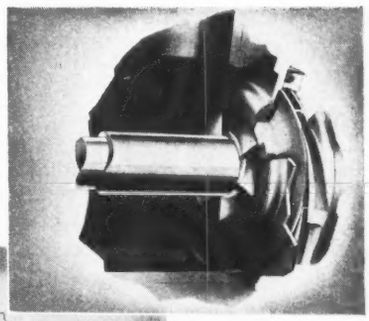
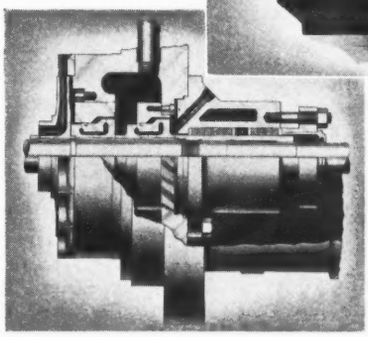
AN AFFILIATE OF DRESSER MANUFACTURING CO.
Executive offices & plant: Huntington Park, California • *Export Office:* 225 Broadway, New York • *Sales & Service:* Offices in principal cities in the United States • *Affiliated Companies:* Clark Bros. Co., Olean, N. Y., Manufacturers of Engines and Compressors; Dresser Manufacturing Co., Bradford, Pa., Manufacturers of Pipes, Couplings, Sleeves, etc.; The Bryant Heater Co., Cleveland, Ohio, Manufacturers of Heating and Air Conditioning Equipment

View of first-stage impeller showing how mixed flow impeller vanes extend out into the suction eye. Low suction velocities are obtained through the design of the large suction bay and large area of first-stage impeller.





Arrangement of balanced, stationary, floating seals for reducing high suction pressure on pump packing and balancing pump thrust. Parts are corrosion proof and the sealing faces are hard faced. Several patents have been issued on this construction and others are pending.

PACIFIC *Engineered* PUMPS

FOR BOILER FEED WATER SERVICE

Send for Bulletins describing Pacific Boiler Feed Pumps for all power plant operations

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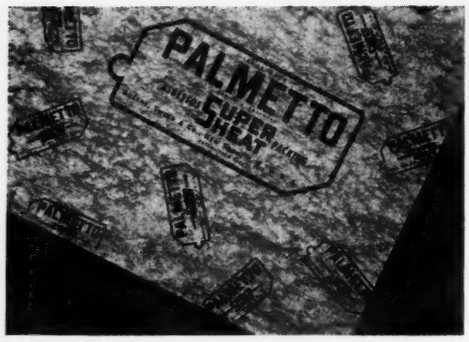

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*PALCO for water
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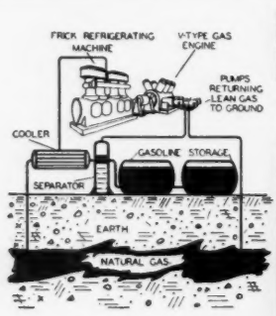
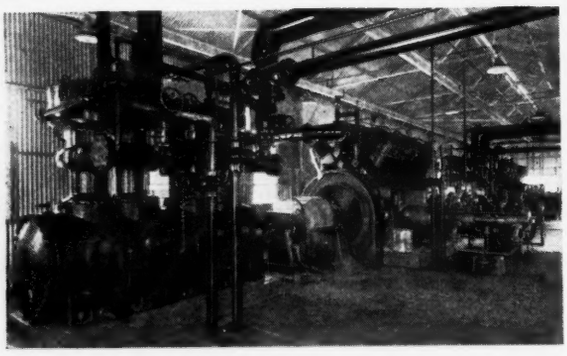
BE SURE TO SPECIFY PALMETTO SUPER HEAT AND BE SURE IT'S GREENE





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They're doing it near Palestine, Texas, using the patented system shown in simplified form in the sketch. Calcium chloride solution sprayed into the gas prevents the freezing of moisture in the cooler.

Daily production of the plant is 38,000 gallons of natural gasoline. Two big Frick compound ammonia compressors, each with four cylinders, cool 40,000,000 cubic feet of gas a day to five degrees above zero.

Another instance of how Frick Refrigeration is indispensable to industry! Whether you need dependable equipment for conditioning air, making ice, doing process work, or any other cooling service, you can rely on Frick Engineers to meet your needs. Let us quote on your requirements.

FRICK CO. Waynesboro, Penna.

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Refrigeration

delphia, Pa. 98-page catalog describes and illustrates range of equipment for controlling liquids, vapors and gases by variations of pressure and level. Includes descriptions of pressure regulators, vacuum stabilizers, pump governors.

341 VALVES—J E Lonergan Co, Race St, Philadelphia, Pa. Supplementary catalog 600 shows advanced and specially-designed safety appliances, including relief valves, steel pop safety valves, and high pressure relief valves.

342 VALVES—Manning, Maxwell & Moore, Inc, Bridgeport, Conn. Consolidated catalog No. 1600 is listing of oil and gas relief valves, capacity tables, over-pressure factor curves and valve selection data.

343 VALVE CHART—Merco Nordstrom Valve Co, 400 Lexington Ave, Pittsburgh, Pa. Novel slide chart permits engineers to ascertain figure number of valve in any available size for any pressure, includes information on semi-steel, steel, and malleable-iron valves.

344 SHUT-OFF VALVE—Homestead Valve Mfg Co, Coraopolis, Pa. 6-page leaflet describes Homestead-Ross air shut-off valves, listing features, and explaining positive operation.

345 VALVES—Ostlind Valve, Inc, Portland, Ore. 6-page bulletin covers Ostlind "spinning-disk" valve, with typical applications, cutaway photographs showing construction, and reports from users on performance. Last section answers questions which might arise on construction or operation, as this valve embodies a new principle.

346 REDUCING VALVE — Fisher Governor Co, Marshalltown, Iowa. 4-page bulletin C-1 describes operation of Type 92 Pilot-operated reducing valve, with capacity tables, dimensions and list prices.

347 VALVES — Reading, Pratt & Cady Div, American Chain & Cable Co, Reading, Pa. 16-page booklet contains information, dimensions, and application recommendations for bronze, carbon steel, and stainless steel bar stock valves.

348 VALVES—E C Atkins & Co, Indianapolis, Ind. File-folder type bulletin covers Atkins Atkomatic valves, giving features and applications.

349 VALVES, FITTINGS—Frick Co., 225 Broadway, Waynesboro, Pa. 36-page catalog K describes all types of valves and fittings made by company for ammonia and Freon 12.

350 RESEATER — Leavitt Machine Co, Orange, Mass. Catalog No. 40 announces line of Dexter valve-reseating outfits for globe, gate, or pump valves.

351 REGULATING VALVES—Cash Universal Regulator Co, Marshalltown, Iowa. 20-page catalog describes company products, including pressure-reducing and regulating valves, relief valves, steam traps and strainers, with capacity charts.

354 VALVES — Lunkenheimer Co, Cincinnati, Ohio, 136-page catalog No. 78 contains descriptions, illustrations, specifications and price list for complete line of Lunkenheimer valves, water columns, fittings, oil cups.

VIBRATION-CONTROL EQUIPMENT

355 VIBRATION CONTROL — The Korfund Co, 48-15 32nd Pl, Long Island City, N. Y. 8-page bulletin describes Korfund vibration control for concrete foundations. Application data included.

356 VIBRATION—Korfund Co, Inc, Long Island City, N. Y. 4-page bulletin Ba-22 covers description of first large diesel generating unit installed successfully without concrete foundation.

WATER-TREATING EQUIPMENT

357 WATER SOFTENERS—The Permutit Co, 330 W 42nd St, New York, N. Y. Bulletin 2341 lists advantages, shows construction and operation, of hot process water softeners.

358 WATER CONDITIONING—Elgin Softener Corp, Elgin, Ill. 16-page booklet entitled "The Inside Story of Boiler Water Conditioning", explains wide variations in boiler-feed waters and operating conditions; how impurities accumulate inside a boiler and how they can be eliminated.

TOTALS FLOW AS A CASH REGISTER TOTALS DOLLARS

Steam IS money. Wasting steam boosts, overhead—eats up income—shrinks profits. Steam accounting is serious business—it needs business methods.

As a modern cash register guards a storekeeper's dollars — producing a printed record of each transaction—so flow meters should guard your power and process steam.

With Brown Flow Meters measuring the flow of fluids for power, heating and processing, you are completely protected—because

The Brown Automatic Recording Planimeter Pen, "A", making the marginal record shown on the chart pictured supplies the PROOF that a definite number of pounds of steam, gallons of water, cubic feet of gas, or barrels of oil, were delivered, utilized—or wasted.

This is a special, patented feature of the greatest value to flow meter users. Reference to the automatic planimeter pen record on chart rim assists you to distribute departmental or process loads more uniformly over the working day, effecting substantial fuel savings not only in the boiler room but in every department or unit where steam is used.

In addition, Brown Flow Meters offer you other advantages such as:

Six inter-related range tubes with inter-related direct reading charts.
Meter Bodies for working pressures up to 2500 lbs.

Integrator dial — easy to read — insures highly accurate totalizing at all rates of flow from 0—100%.

Universal case permits any style panel mounting—flush on panel, front-of-board or on wall.

Indicating, Recording and Controlling models —Electrical, Mechanical and Area types for all applications.

Get all the facts about Brown Flow Meters. Features are fully explained in Catalog No. 2007. Send for your copy. THE BROWN INSTRUMENT COMPANY, a division of Minneapolis-Honeywell Regulator Co., 4490 Wayne Avenue, Philadelphia, Pa. Offices in all principal cities. Toronto, Canada: 117 Peter Street—Amsterdam-C, Holland: Wijdesteeg 4—England: Wadsworth Road, Perivale, Middlesex—Stockholm, Sweden: Nybrokajen 7.

"A"—This automatic planimeter pen record shows steam flow in volume units and the time at which it was produced or used in any part of the 24 hour period, enabling you to easily analyze steam production and distribution.

"B"—This record line shows rate of flow and enables the operators to maintain the most efficient boiler operation, thus effecting substantial fuel savings.

BROWN Flow Meters

Accurate Measurement with Simplicity

REMOVE RUST
FROM PIPES
by
Colloidal
ACTION
NOT CHEMICAL NOR MECHANICAL

Where hot or cold water supply systems, steam and hot water heating plants or low pressure boilers are used, there exists the problem of eliminating accumulated rust and scale, the cause of congestion, discolored water, noisy pipes and radiators and ineffective costly heating.

Remove it safely and quickly by using

Mogul
RUST ERADICATOR

a colloidal product with a physical, not chemical, action. Mogul will not affect drinking water, nor interrupt service. Retards further action of rust.

Ask about the new Mogul Water Testing Set furnished free to Mogul users

The North American Fibre Products Company

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Field Engineers Everywhere

BACKED BY A BOND ISSUED BY THE FIDELITY & CASUALTY CO., of N. Y.

359 ALGAE ELIMINATOR—National Aluminate Corp, 62166 West 66th Place, Chicago, Ill. 4-page bulletin No. 31 describes Nalco No. 21, organic sterilizing agent used to control algae, slime and bacterial growths that form in water used for industrial purposes.

360 HOT-PROCESS SOFTENERS—Cochrane Corp, 17th & Allegheny Aves, Philadelphia, Pa. 12-page bulletin No. 2059 describes hot-lime-and-soda feed water treatment when combined with integral deaeration equipment to eliminate dissolved oxygen and corrosive gases.

361 WATER SOFTENERS—Graver Tank & Mfg Co, East Chicago, Ind. 12-page booklet Form No. 303 covers Graver hot-process water softeners, describing each part in detail, and giving line drawing showing the system without a deaerating heater, and with a heater and storage compartment.

362 WATER SOFTENING—American Water Softener Co, 322 Lehigh Ave, Philadelphia, Pa. Illustrated bulletin No. 111 concerns hot process water softening. Answers numerous questions about time required for hot process system to work, proper phase of a softening process in which to deaerate, how to conserve steam.

363 CORROSION CONTROL—D W Haering & Co, Inc, 2306 S Winchester Ave, Chicago. Ill. Third edition of 16-page booklet explains and describes principles of organic and colloidal chemistry underlying application of organic chemistry to water treatment.

364 BOILER WATER CONTROL—Henszey Co, Watertown, Wis. 36-page booklet entitled "Boiler Water Impurities and their Control", describes boiler-water troubles, boiler-water impurities, including various chemicals found in it, gives system for analyzing water and describes methods for control.

365 CHEMICAL FEEDER—Permutit Co, 330 West 42nd St, New York, N. Y. 4-page illustrated bulletin describes oscillating type dry chemical feeder. Capacities, specifications and line drawings show construction.

366 PROPORTIONERS — Cochrane Corp, 17th & Allegheny Ave, Philadelphia, Pa. Bulletin No. 2985 describes Cochrane air-actuated proportioner for feeding sulphuric acid in conditioning boiler feed-water.

367 BOILER-WATER TESTING—W H & L D Betz, 235 W Wyoming Ave, Philadelphia, Pa. 16-page booklet, "How to Run a Control Water Analysis", reprints series of five articles from POWER on "How to Run a Water Analysis", "How to Test for Hardness", "How to Test for Alkalinity", "How to Test for Phosphates", and "How to Test for Chlorides". Photos show exactly how to perform each operation and text gives operator information necessary to calculate results.

368 SILICA REMOVAL — Permutit Co, 330 West 42nd St, New York, N. Y. 8-page bulletin No. 2377 describes low-cost process, "Mag-de-Sil", for Silica removal, without appreciable increase in total dissolved solids. Bulletin is summary of high points of research program made by company.

369 WATER-TREATMENT PROBLEMS—Hall Laboratories, Inc, Pittsburgh, Pa. Pamphlet entitled "Seventeen Case Histories from the Files of Hall Laboratories," presents material extracted directly from client files, in a brief, straightforward and personal manner, without embellishment. Provides a good insight into various water problems existing in representative plants throughout the country.

370 MIXING, FEEDING & PROPORTIONING—International Filter Co, 325 W 25th Place, Chicago, Ill. Infilco products for chemical mixing, feeding and proportioning, for hydraulic measurement and control, and for conditioning water, processing liquids and trade wastes are illustrated and described in condensed catalog No. 50.

371 FEEDWATER TREATMENT—Elgin Softener Corp, 55 North St, Elgin, Ill. 8-page Bulletin 550 clearly and concisely describes the subject of boiler-water treatment. Starting with a treatise of water and its impurities, this bulletin explains the essential steps required in treating boiler water.

372 WATER SOFTENERS — Elgin Softener Corp, 55 North St, Elgin, Ill. Bulletin 602, 16 pages, describes zeolite water softeners and other water-conditioning equipment. Four

HERCULES
Seamless Copper
FLOATS

GUARANTEED
TO STAND UP!

Every Hercules Float carries our guarantee to stand up under 350 lbs. working pressure and 500 degrees temperature.

Fabricated of seamless copper under our special spinning process. Hercules Floats are uniform in thickness and high in mechanical strength.

You can depend on Hercules for floats—in standard shapes up to 10 in. and in special types to your specifications—to give long, dependable, economical service.

Insure care-free maintenance of water level in your heaters, tanks, reservoirs and other equipment by specifying "HERCULES."

HERCULES FLOAT WORKS
200 Franklin St.
SPRINGFIELD, MASS.

Babbitt
—Adjustable—
SPROCKET RIM
with Chain Guide

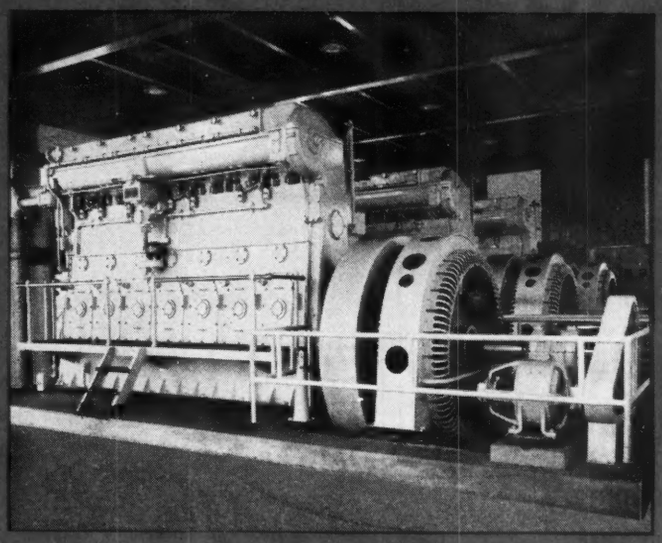
MAKE YOUR OVERHEAD VALVES SAFE and EASY TO REACH—
CONTROL VALVES FROM THE FLOOR

With Babbitt Sprocket Rims on your overhead valves, you can control valves instantly from the floor. Far quicker and safer than climbing ladders.

Babbitt Rims are easily attached in a few minutes, are inexpensive and assure safe, positive and instantaneous overhead valve operation. Available for valves of every make or style. Write for details.

BABBITT STEAM SPECIALTY CO.
New Bedford Mass.

It's the low upkeep that counts!



These 750-H.P. Rathbun-Jones engines operating on sewage gas at Columbus, Ohio Sewage Disposal Plant have been in continuous operation since installation. MARATHON V.E.P. OIL has been used exclusively.

• Whether you are struggling along with an antequated power unit, or have a brand new up-to-date engine, your job is to operate as economically as possible. Freedom from interruptions, escape from time-consuming maintenance and servicing—in short, LOW UPKEEP is what *really* counts. And it is here that correct lubrication becomes your principal ally. It is of such importance that, truly, economical operation *demands* correct lubrication.

MARATHON V.E.P. OIL

Gives you

MAXIMUM PROTECTION
LOWER MAINTENANCE COST
MORE EFFICIENT OPERATION

• • •

Call in one of our Lubrication Engineers and let him tell you *exactly* how these advantages will apply to your particular requirements.

• • •

How?

MARATHON
"BEST IN THE LONG RUN"

THE OHIO OIL COMPANY
INCORPORATED
GENERAL OFFICES — FINDLAY, OHIO

A PACT

SAND-BANUM **removes and prevents boiler scale and corrosion—regardless of water and operating conditions**

OR

YOU **owe us nothing!**

"The Entirely Different Boiler and Engine Treatment"

Does it surely, safely and economically. **We will prove it by the record**

OR

YOU prove it by your own test. **Write for details of non-obligatory "satisfaction OR no money guarantee."**

AMERICAN SAND-BANUM COMPANY, Inc.

9 Rockefeller Plaza — **New York City**

WESTERN SAND-BANUM CO.

Houston, Texas — Fresno, Calif.

Export Representative, PETROLEUM MACHINERY CORP.

30 Rockefeller Plaza — New York City

TOUGH REPAIR for BROKEN CONCRETE

Avoid accidents! Prevent costly delays! Repair holes, cracks, broken places in concrete floors or resurface an entire area with the durable RUGGED-WEAR RESURFACER. No chopping or chipping required. Merely sweep out spot to be repaired—mix the material—trowel it on. Holds solid and tight right up to irregular edge of old concrete. Cellulose-Processed to provide a firmer, tougher, smoother, more rugged wearing surface. Used indoors or out. Dries fast. Costs only 10c to 14c per sq. ft.

Valuable 68-page "HAND BOOK OF BUILDING MAINTENANCE" available to those requesting on business letterhead.

MAKE THIS TEST!

FLEXROCK COMPANY
2377 Manning St., Phila., Penna.

Please send me complete RUGGEDWEAR information . . . details of FREE TRIAL OFFER —no obligation.

Name .....
Company .....
Address .....
City ..... State .....

SAFE TRACTION *with* BATESGRATES

ELECTRICALLY PRESSURE WELDED

Non-slip, sharp top edge, self-cleaning cross bars like the ridge of a roof give you the maximum in safe traction. Other features your Batesgrate dollars buy are—maximum open area for light and air—no grooves or rough burned metal to catch grease or dirt—fillet weld, the strongest type—no cracks, joints, or crevices, therefore, easily maintained—smooth, clean appearance. Get all the important details from Catalog No. 937—Write today.

WHEN YOU NEED GRATES

***Specify* BATES**

FOR LONG-TIME ECONOMY

WALTER BATES COMPANY

208 S. LA SALLE ST., CHICAGO, ILL.

modern outstanding types of zeolite water softeners and their operating principles are discussed. Other subjects discussed are iron and manganese removal, filtration, aeration, and boiler-water-conditioning systems.

373 WATER SOFTENERS — Elgin Softener Corp, 55 North St, Elgin, Ill. Single-page leaflet describes the new 1941 Model Elgin "Double Check" zeolite softener said to give a 25% increase in water-softening efficiency. Can also be used to modernize old zeolite softeners.

WELDING EQUIPMENT

374 WELDERS—Westinghouse Elect & Mfg Co, E Pittsburgh, Pa. Descriptive data 26-100 includes information on dimensions, weights and ratings for various types of machines. Application for each type is discussed, along with a general description of each.

375 WELDING PRODUCTS—Air Reduction Co, East 42nd St, New York, N. Y. 32-page illustrated booklet describes complete line of Airco electrodes and Wilson electric welding machines. Discusses various types of electrodes and makes suggestions as to where each can be used to advantage.

376 WELDING GUIDE—Linde Air Products Co, 30 East 42nd St, New York, N. Y. Chart gives guide to welding commonly used metals and alloys. Recommended welding method, flame adjustment, welding rod, and flux for each of the 30 different metals and alloys can be determined by reference to the chart. Form 4464.

377 ELECTRODES—McKay Co, York, Pa. Catalog E-16 contains information concerning selection of proper electrodes for various jobs, and includes tentative specifications for iron and steel electrodes.

378 WELDING NECKS—Lenape Hydraulic Pressing & Forging Co, West Chester, Pa. 42-page catalog lists all "Red Man" products made by company, including welding necks, nozzles and manholes for pressure vessels.

379 WELDING RODS — Dymonhard Corp of America, 250 57th St, New York, N. Y. 6-page bulletin describes Dymonhard facing rods, giving principal facts concerning their use.

380 ELECTRODES—Hobart Brothers Co, Hobart Square, Troy, Ohio. 20-page booklet covers complete line of welding accessories and electrodes. Descriptions of electrode holders, hood and hand shields, protective clothing, etc.

381 ELECTRODES—Lincoln Electric Co, 12818 Coit Road, Cleveland, Ohio. Wall-type chart gives uses, physical characteristics, etc, as well as currents and procedures for about 36 different electrodes.

382 FLAME-HARDENING EQUIPMENT — Air Reduction Co, 60 East 42nd St., New York, N. Y. 10-page booklet makes available details on considerations and apparatus involved in flame-hardening surfaces of various forms. Describes specifically Airco style 4383 water-cooled flame-hardening torch 4383 water-cooled flame-hardening torch.

383 WELDING DIRECTORY — Lincoln Electric Co, 12818 Coit Rd, Cleveland, Ohio. 56-page bulletin No. 402 gives reasons why users should use Lincoln products, and includes complete directory of these products, such as cable, electrodes, protective and other welding supplies, etc.

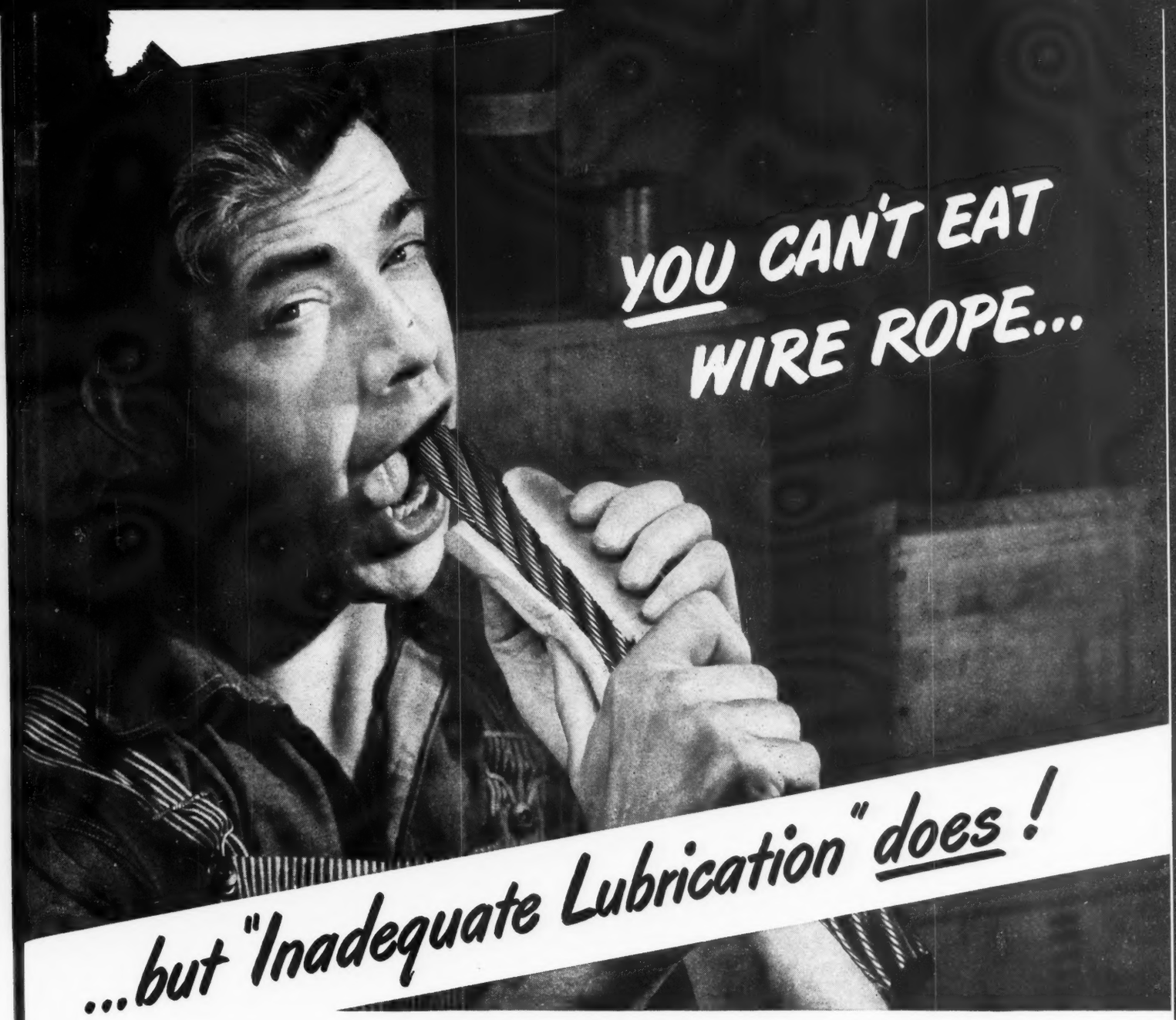
384 WELDING — Hobart Bros Co, Troy, Ohio. 4-page folder describes Hobart simplified arc welder, showing features and users' reports of profits and savings.

385 ELECTRODES—Metal & Thermit Corp, 120 Broadway, New York, N. Y. 22-page pamphlet gives complete data on physical properties, chemical analysis, qualifications, approvals and recommended procedures for all Murex mild steel welded electrodes.

386 ACETYLENE GENERATORS — Marquette Mfg Co, Minneapolis, Minn. Catalog-page tells advantages of acetylene generator as compared with acetylene cylinder service, and also describes portable acetylene generator.

OTHER EQUIPMENT & SUPPLIES

387 PAGER UNIT — The Autocall Co, 340 Tucker Ave, Shelby, Ohio. 4-page bulletin covers paging unit which can locate automatically from one to 20 individuals by code system.



Perhaps you never thought of lubrication in just this way — but picture to yourself thousands of tiny "bearings" sliding and pressing against each other. Naturally, they must be lubricated — and naturally you'll see that they are lubricated in your wire ropes — when you realize what it means in dollars and cents.

A proper wire rope lubricant regularly applied to the rope on the job, forms a protective coating that keeps those thousands of "bearings" operating with minimum friction. The result: — Wire fatigue and corrosion checked; more uniform wear; longer rope life.

Be sure your lubricant is the *right* one, that you are applying it properly and with sufficient frequency.

JOHN A. ROEBLING'S SONS CO.
Trenton, N. J. *Branches in Principal Cities*

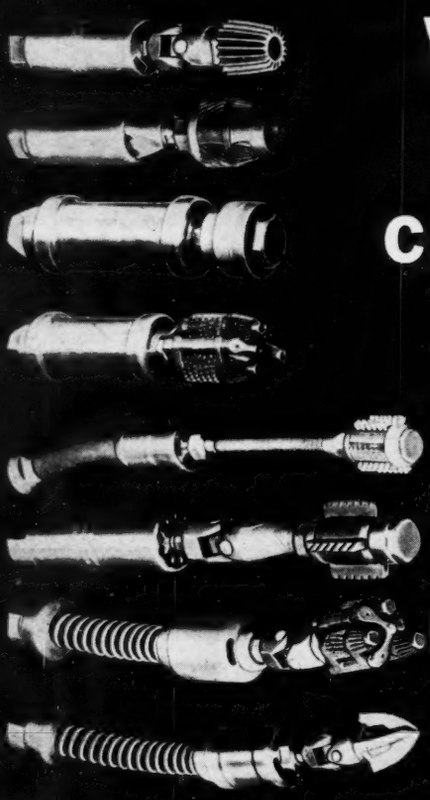
ROEBLING
JAR Wire Rope

CORRECT LUBRICATION:

1. *Reduces Rope Wear*
2. *Prevents Corrosion*
3. *Prolongs Rope Life*
4. *Lowers Operating Cost*
5. *Provides Greater Safety*

This advertisement is published in the interest of all wire rope users to help them obtain greater safety, service and efficiency from their wire rope.

Ask about **ROEBLING "BLUE CENTER" WIRE ROPE** *... either preformed or standard*



WILSON TUBE CLEANERS CLEAN ANY TUBE BETTER, FASTER

There's a Wilson Tube Cleaner, cutter head, brush or other accessory especially designed and built for efficiently and economically cleaning *any* ferrous or non-ferrous metal tube or pipe, straight or curved—of large or small diameter—that *can* be cleaned mechanically.

Wilson Tube Cleaners are proving their superiority in power, efficiency and economy wherever used.

Write for the name of our representative nearest to you or send for a copy of our new thirty-six page catalog fully describing and illustrating the complete line of Wilson tube cleaning equipment.

THOMAS C. WILSON, Inc.
PIPE AND TUBE CLEANERS EXCLUSIVELY
47-28 37th Street Long Island City, N. Y.

SAVE AIR—SAVE DOLLARS
WITH
ROCKWELL BLAST GATES
FOR LOW PRESSURE AIR

Threaded Slide Type

SLIDE TYPE BUTTERFLY TYPE
WAFER BUTTERFLY TYPE
KWIKLEEN TYPE

Write for catalog No. 3760

W. S. ROCKWELL COMPANY
50 CHURCH ST. NEW YORK

Flanged Slide Type

388 HYDRAULIC EQUIPMENT — Blackhawk Mfg Co, Milwaukee, Wis. Catalog No. 40H covers "Porto-Power" pipe and conduit benders, remote-control jacks; also hydraulic hand jacks, gage-equipped hydraulic jacks, inverted hydraulic hand jacks, and wheeled service jacks. Drawings and photos show construction and use, charts and tables list capacities and specifications.

389 GRATINGS & SURFACES—Wm F Klemp Co, 6601 S Melvina Ave, Chicago, Ill. File folder describes Diamond grating, steel stair treads, "Hextell" heavy-duty surface armor, and "Klem-Acme" floor steel, with tables of safe loads, and information on assembly and recommended fillers.

390 FIRE PROTECTION — C-O-Two Fire Equipment Co, 10 Empire St, Newark, N. J. "In Case of Fire", booklet No. C24, 8 pages, 2 colors, illustrated, describes use of CO_2 for fire extinguishment. Shows complete line of hand and wheeled extinguishers, recharging equipment, sales and service points.

New Plant Equipment

(Continued from page 76)

tive. Solution, applied at normal or slightly elevated temperatures to promote rapid drying hardens on exposure to light. *Acheson Colloids Corp, Port Huron, Mich.*

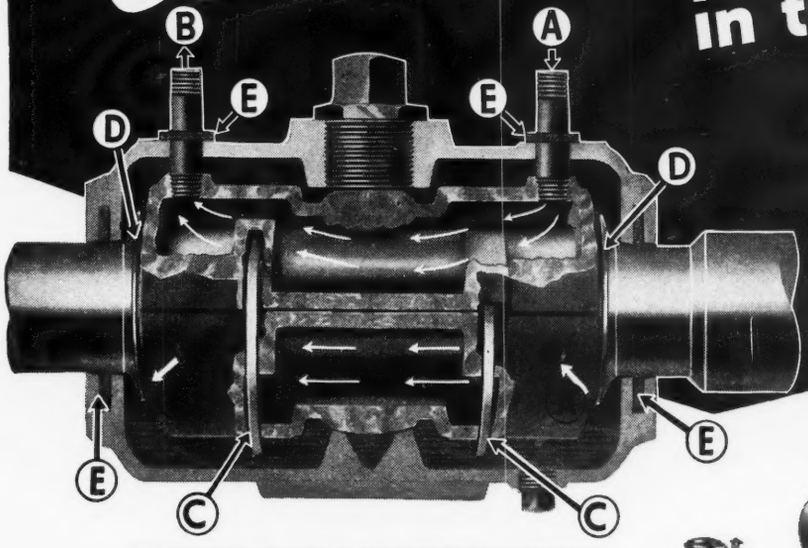
INDUSTRIAL CLEANER—Cold immersion cleaner said to be fire-safe, non-toxic and non-corrosive. Removes dirt, grease, carbon and gum; loosens paint and lacquer, but is said not to pit or blacken any metal or alloy. Cleaner is used cold, articles to be cleaned being immersed and left. After operation is complete, articles are removed and rinsed. *Bendix Products Div, South Bend, Ind.*

FUEL TREATMENT — "Liquid-Kleen-Flo" claimed to render catalytic effect on combustion, and is said to improve fuel oil by reducing its surface tension. Solution is added down feed line to fuel in ratio of one gal to every 2000 of fuel oil added to storage tank prior to its delivery. Said to combine chemically with moisture content in mechanical suspension in oil body, forming new combinatoin of hydrocarbons that disperse throughout and burn in flame. Mixture said not to have harmful acids or petroleum derivatives, and manufacturer claims that it will not alter flash point of oil. *Combustion Service Co, 1451 Broadway, New York, N. Y.*

INHIBITOR—Organic chromium inhibitor is used in small quantities. Experimentally applied in both liquid and vapor phases, chemical is said to control both oxidation and sulphuric types of corrosion. Quachrom Glucosate, as inhibitor is called, forms oxidation film which protects metal surfaces from corrosive attack. *D W Haering & Co, 2308 S Winchester Ave, Chicago, Ill.*

SCALE REMOVER—Mogul rust eradicator, based on well-known colloidal principle, removes scale as well as concentrated matter which collects in hot- or cold-water supply systems, low-pressure boilers, etc. Colloids attract and expand, and when injected into water, attach themselves to foreign substances in water, increasing the weight of the substances, causing them to sink to the bottom of the boiler. Then they can be drained or blown out of the system. Also claimed that colloids moving around in water get in between cracks of scale present and through expansion, gradually disintegrate the scale. Film of aqueous coating, which is heat conducting and which does not build up like scale, remains to protect metal against pitting and corrosion. *North American Fibre Products Co, Keith Bldg, Cleveland, Ohio.*

Another Reason Why CLARAGE is Ace-High in this Toughest of ALL Fan Services

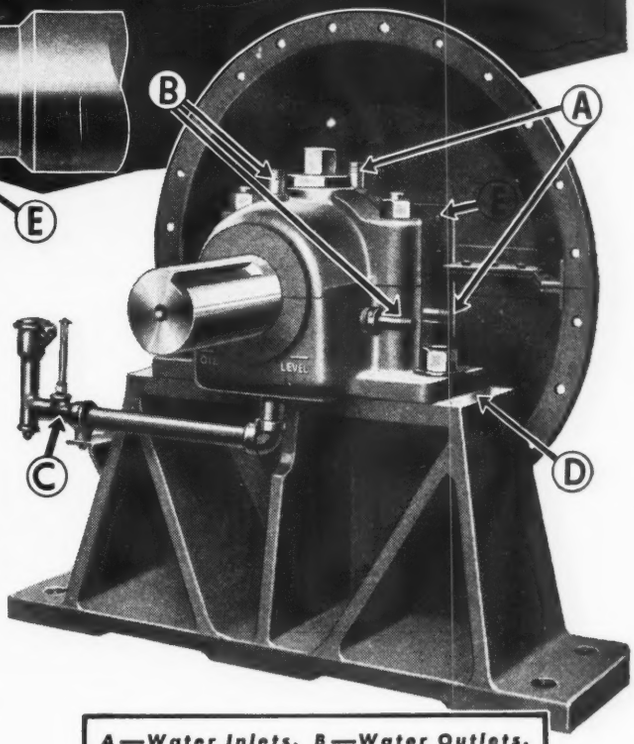


A—Water Inlets. B—Water Outlets. C—Oil Rings. D—Thrust Collars (forged, turned and ground); integral part of shaft. E—Seals prevent dust leakage into bearing.

These Husky Water-Cooled Bearings are Standard on RT Induced Draft Fans

Wheel tip speeds may run as high as 240 miles an hour—temperatures may exceed 700° F.—that's modern induced draft — *toughest of all fan services!*

To help meet such requirements successfully, we equip Clarage Type RT Fans with bearings as shown above. Note liberal size, high grade construction and precision features.

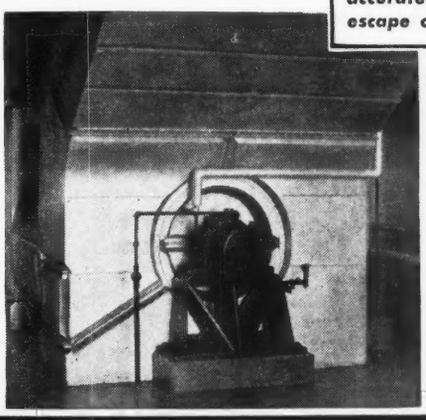


A—Water Inlets. B—Water Outlets. C—Oil Filler Cup and Pipe. D—Bottom of Bearing and top of Support machined for accurate alignment. E—Shaft Seal prevents escape of gases from fan.

Note, too, that cooling water is circulated through each half of the bearing sleeve independently of the other—no joints or gaskets—no possibility of water leaking into bearing lubrication.

These BETTER bearings are an important factor in assuring each Clarage RT Induced Draft Fan a trouble-free service life far longer than normal expectancy.

And this ability to out-perform and out-last is equally characteristic of other Clarage Fans and Blowers. If you have ANY air handling problem, it will pay you to get in touch with us.



RT Induced Draft Fan installed in central station of large public utility—one of over 2,000 Clarage power plant installations.

Photo illustrates comparative size of fan and bearings—big husky bearings equal to any service condition.

CLARAGE FAN COMPANY—KALAMAZOO, MICH.
SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES

COMPLETE AIR CONDITIONING
•
COOLING
•
VENTILATION
•
FACTORY HEATING
•
MECHANICAL DRAFT
•
FANS and BLOWERS for INDUSTRIAL NEEDS

The Story of RIC-WIL INSULATED PIPE UNITS Recorded In Pictures

STABILITY
STRENGTH
SIMPLICITY
AIR SPACE
REAL PIPE SUPPORT AND GUIDE SCREW INTO CONDUIT — REMOVABLE
PIPE AND ITS COVERING FREE FROM ANY LOAD ON THE CONDUIT
HEAVY ASPHALT SHELL IS OUTSIDE OF AND SUPPORTED BY STRONG ARMCO CONDUIT
CROSS SECTION
DURABLE WATERTIGHT ENGINEERING
RIC-WIL INSULATED PIPE UNITS
BUTT WELDED CONNECTION BETWEEN UNITS
JOINT ASPHALT COATED & WRAPPED AFTER WELDING
Ranger Engineering Co., Farmingdale, L. I., N. Y
General Motors Co., Norwood, O.
Welding conduit. With this connection, plain ring pipe supports are used and Conduit is free to slip over pipe, insulation and supports.
Nemours Foundation Hospital, Longwood, Del., showing curved line.
Union College, Schenectady, N. Y
Housing project, showing typical fittings.
U. S. Letters Pat. No. 1991455
START. 160 ft. installed in 23 hrs. — a Rochester Gas & Electric Co. job. FINISH
Shallow trench is practical for Ric-wil Units.
Adequate strength under railroad tracks.
Connection with pre-fabricated manhole.
Ric-wil Units in production at factory.
Fittings for expansion and special shapes and bends are furnished as necessary.
Welding steam pipe.
Shaker Square Co., Cleveland wrapping joint before installing connector.
Units delivered on a typical housing job.
Installing connector sleeve.
50-ft. long Units for Ohio Edison Co., Akron, O.
Welded into a single piece 700 feet long, this pipe was dropped into the open trench beside which it lies, to become a link in the steam line by which the Ohio Edison Co. will furnish heat to the housing project in Elizabeth Park, Akron, Ohio.

Detailed Bulletins sent on request

Asphalt of Quality and "Life" *Protects* a Strong, Pure Iron Shell of Precision Pre-Fabrication by Armco

Unique
Strong • Dependable!
Made Possible only by Modern Engineering!

Pre-Sealed by Ric-wil

THE RIC-WIL CO.

CLEVELAND, OHIO *Agents in Principal Cities*

FOR UNDERGROUND OR OVERHEAD STEAM LINES

AS *Easy* TO GET AS THEY ARE *Easy* TO INSTALL

● Not far from your plant is an ELECTRUNITE distributor — with complete stocks of these money-saving, electric welded boiler tubes. He may be just around the corner, several blocks away or in a nearby city — but, in any event, he can deliver the tubes you need in a hurry, and that's important when a boiler is down for repairs and you're suffering for lack of boiler capacity. He is in business for one purpose — and that is to supply you with tubes when you need them.

Now, about the tubes he will send you —ELECTRUNITE Boiler Tubes. Their records of service in every type of boiler have proved beyond any doubt that they are SAFE and SOUND. Acceptance and approval by central stations, boiler manufacturers, railroads, insurance companies and codes further attest their dependability. Their ease of installation has resulted in reports of up to 20% savings in installation costs. They expand and bead easily —make tight joints—speed up installation—because they are consistently uniform in diameter, wall thickness, concentricity and ductility. And their fine, smooth, scale-free surface inhibits corrosion.

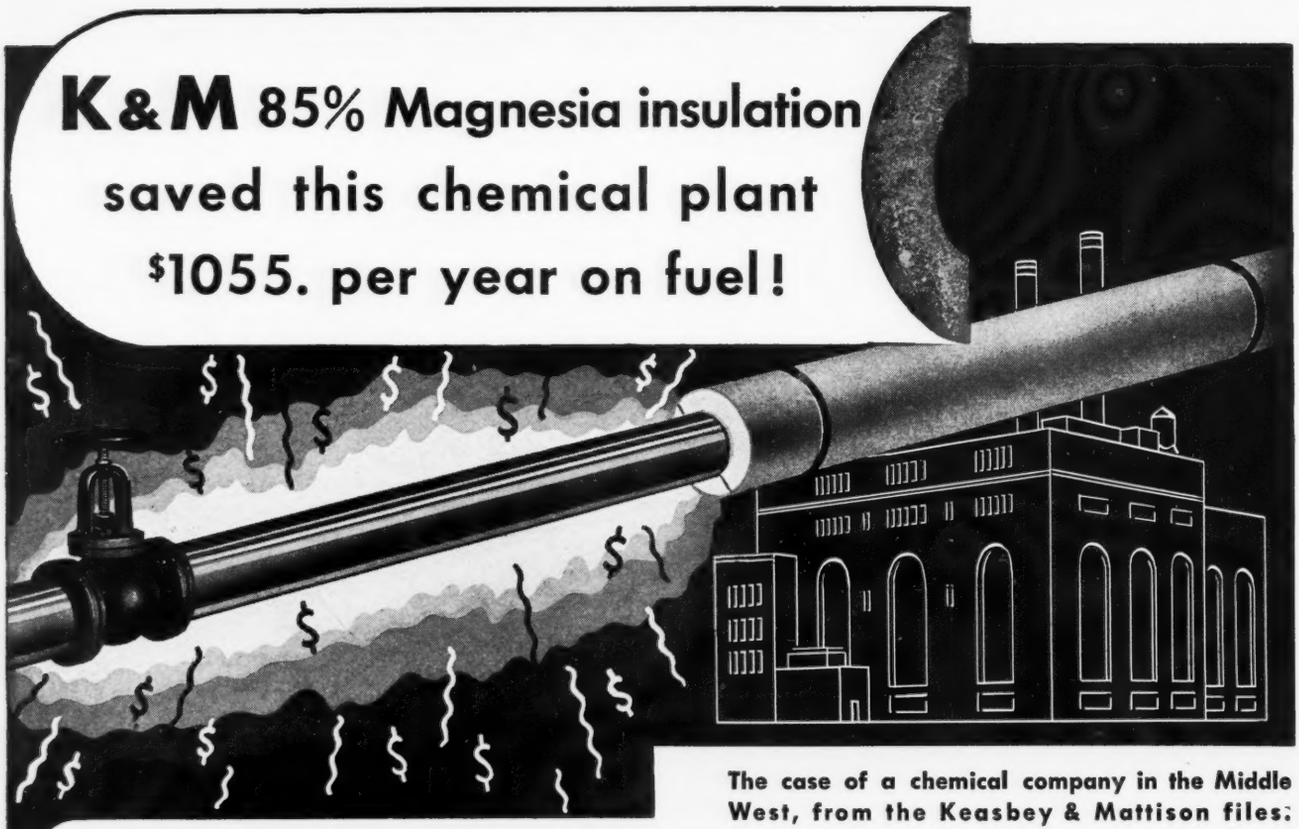
Ask your ELECTRUNITE distributor for literature—then call him when you need tubes. If you don't know his name, write us. Steel and Tubes Division, Republic Steel Corporation, Cleveland, Ohio.

Republic **ELECTRUNITE**

REG. U. S. PAT. OFF.

ELECTRIC RESISTANCE WELDED BOILER TUBES

K&M 85% Magnesia insulation saved this chemical plant $1055. per year on fuel!



The case of a chemical company in the Middle West, from the Keasbey & Mattison files:

LIKE many other specialized modern products, Keasbey & Mattison heat insulations are installed in a plant—not on the basis of guesswork—but on sound engineering recommendations following a scientific analysis of the problem.

For example, a chemical company in the Middle West began operation of a new plant without insulation of the steam lines. K & M engineers were called in to make a survey. They found that the installation of the correct K & M insulations would reduce the total heat loss more than 86% with an estimated fuel saving of $1055. per year—nearly $50. more than the cost of the K & M insulations! This saving was borne out in the first year's operation.

Naturally, in every succeeding year this plant would save more than one thousand dollars on fuel alone, in addition to the far better control of heat made possible.

This is but a single instance of the way K & M engineers, through the use of specialized Keasbey & Mattison insulation products, are saving heat, fuel and dollars for plants in every industry. Among the products that enable these men to produce such substantial economies is K & M "Featherweight" 85% Magnesia, one of the most efficient heat insulators ever developed for use at temperatures up to 600°F.

K & M engineers, working with K & M Distributors strategically located throughout the country, can point the way to real savings in your plant, too. Why not write Dept. 11 for full details?

K & M "Featherweight" 85% Magnesia

KEASBEY & MATTISON

COMPANY, AMBLER, PENNSYLVANIA

CINCINNATI GAS and ELECTRIC

Installed

Messrs. Sargent & Lundy
Chicago
Consulting Engineers

BARTLETT-SNOW COAL HANDLING EQUIPMENT

● Complete with a receiving hopper, that is loaded by truck and discharged with a duplex reciprocating feeder, five belt conveyors having 176; 154; 49; 118; and 35 foot centers respectively, a coal crusher, magnetic pulley, belt tripper, a 72 foot reversing shuttle belt that discharges into any part of a bunker twice its length, and a coal reclaiming system, the Bartlett-Snow equipment at Cincinnati—like other Bartlett-Snow installations—has met fully the customer's requirements.

Designed by men who do now—and have for years—devoted their entire activity to coal handling problems . . and fabricated to Bartlett-Snow's nationally recognized standards in our own machine and structural shops under the exacting inspection of the designers themselves instead of being jobbed out to other fabricators—Bartlett-Snow equipment is ideally suited to the individual requirement . . . and in addition, reflects the many refinements and niceties of design and fabrication that promote efficient and trouble-free operation in service.

That is why you'll find Bartlett-Snow coal handling equipment being selected in preference to other equipment by many of the best known and most representative central stations—and large, medium and small industrial boiler plants alike . . . It meets the need more accurately and works better. More complete information including illustrations of recent installations, equipment details, etc., are contained in a 48 page bulletin, copies of which will be sent on request. Send for your bulletin today.

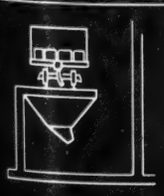
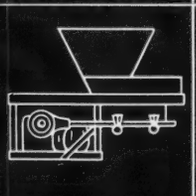
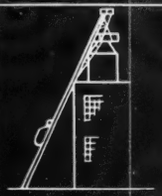
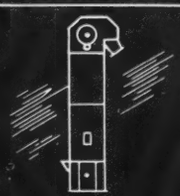
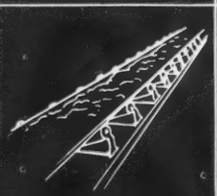
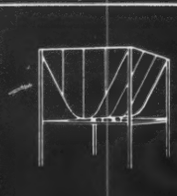
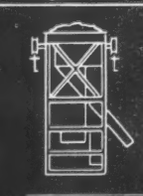
THE C. O. BARTLETT & SNOW COMPANY

New York • Chicago • **CLEVELAND, OHIO** • Baltimore • Des Moines

BARTLETT-SNOW

• • BOILER PLANT COAL HANDLING SYSTEMS • •

Complete Engineering and Fabricating Facilities to Meet Any Requirement Including

Track Hoppers	Gates and Feeders	Skip Hoists	Bucket Elevators	Belt Conveyors	Bins and Bunkers	Weigh Larries
						

3 OUT OF 4

OF THE POWER PLANT UNITS ERECTED SINCE 1935

CHOSE COAL

FOR ECONOMY, EFFICIENCY, DEPENDABILITY!

WHY THIS OVERWHELMING preference for solid fuel?

"Reliability of operation . . . low fuel cost per 1,000 pounds of steam . . . lower repair and maintenance costs," say the power engineers. "Lower cost per unit of production . . . fewer slowdowns or shutdowns," say the production men.

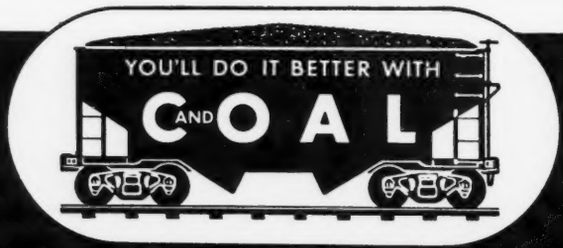
Three out of four—but the preference means even more when you look at the remaining 25%, for many of these aren't lucky enough to be located near sources of quality coals.

What do *you* need in coal? Higher B.T.U.? Higher ash softening temperature? Lower ash content? High or low volatile? Grindability? Greater uniformity? Somewhere along Chesapeake and Ohio — in "The Coal Bin of America" — is a bituminous coal to meet your exact requirements.

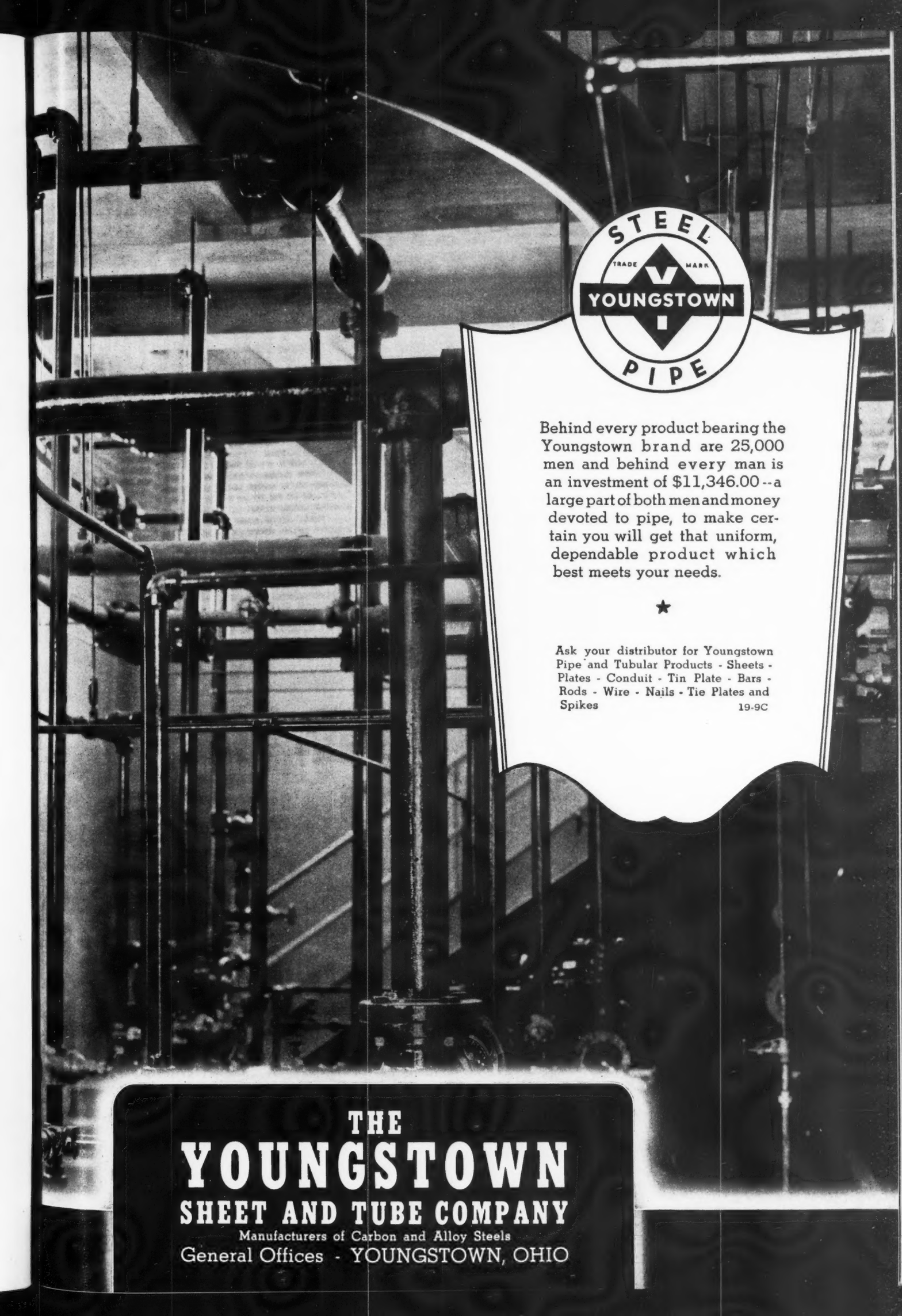
In the mines of this region, modern methods guarantee *uniformity*—of quality—of cleanliness —of sizing. In fact, from mines served by Chesapeake and Ohio you can get coal prepared and sized *to your order* . . . coal of the quality that means dependable operation.

Delivery service is equally fine. Chesapeake and Ohio's huge fleet of cars keeps coal continuously rolling to market. And working with this railroad's A-1 plant and equipment is a trained operating and service personnel, always alert to see that coal buyers get exactly what they want.

For information or assistance with your fuel problems, write GEORGE H. REINBRECHT, Coal Traffic Manager, Chesapeake and Ohio Lines, 2901 Terminal Tower, Cleveland, O.



CHESAPEAKE AND OHIO LINES



Behind every product bearing the Youngstown brand are 25,000 men and behind every man is an investment of $11,346.00 -- a large part of both men and money devoted to pipe, to make certain you will get that uniform, dependable product which best meets your needs.

★

Ask your distributor for Youngstown Pipe and Tubular Products - Sheets - Plates - Conduit - Tin Plate - Bars - Rods - Wire - Nails - Tie Plates and Spikes

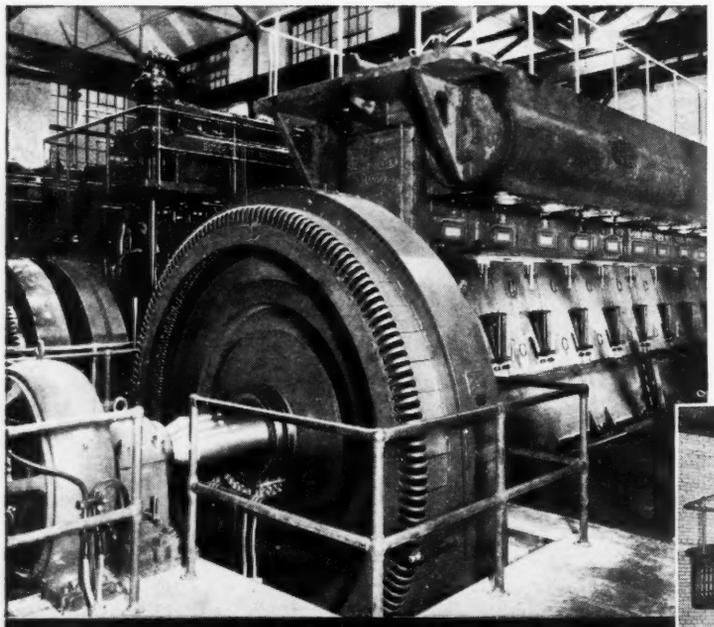
19-9C

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels

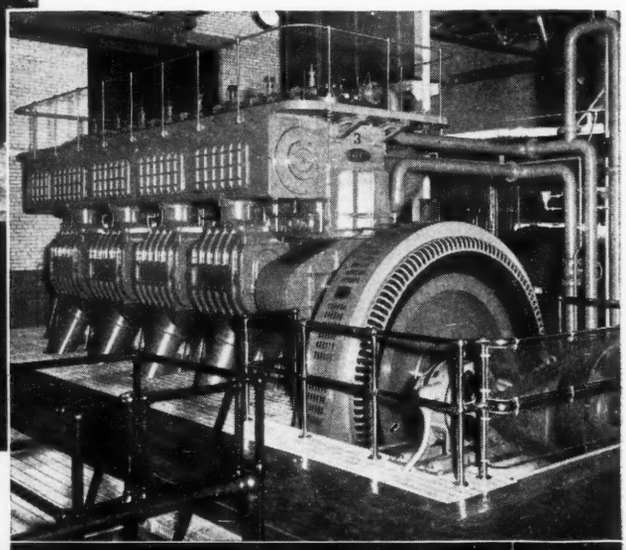
General Offices - YOUNGSTOWN, OHIO

ONE GOOD ENGINE



All Diesels—all Busch-Sulzer Diesels at Freeport, N.Y. In 20 years this municipal plant has purchased 8 Busch-Sulzer Diesels. All are operating successfully today—seven at Freeport—one elsewhere (the original 1920 installation). Pictured above are the 7th and 8th Freeport installations—of the same type as the ninth Busch-Sulzer engine, now on order.

DESERVES ANOTHER ...AND ANOTHER ...AND ANOTHER



Modern, Busch-Sulzer Diesel engine of the trunk piston, single acting, mechanical injection type.

That's the way it has been all along at Freeport, Long Island—the Busch-Sulzer way—ever since this municipal power plant installed its first Diesel in 1920.

History repeats itself—a history of dependable and efficient engine operation. Today, Busch-Sulzer has received its *ninth consecutive order* from this city, which like so many other power plants, has found Diesel better—and better still, Busch-Sulzer Diesels. It's for a 9-cylinder, 3060 B. H. P. Diesel of the trunk piston, single acting, mechanical injection type—the same type that has proved itself over and over again in dollars saved and dollars earned.

When this new engine takes its place on the line, Freeport will have over 14,000 H. P.—eight Busch-Sulzer engines in operation, all of which have been purchased during this city's long and successful Diesel history. No other make of Diesel engine has ever served this municipality.

Doesn't all this add up to DEPENDABILITY?

BUSCH-SULZER BROS.–DIESEL ENGINE CO.

BUSCH-SULZER

ST. LOUIS

NEW YORK CITY SALES OFFICE TWO RECTOR STREET

SAN FRANCISCO SALES OFFICE RIALTO BLDG

America's Oldest Builder of DIESEL ENGINES

COPR. 1940. BUSCH-SULZER BROS.–DIESEL ENGINE CO.

A flying start....

FOR THE DAY'S WORK .... this Exide cranks Diesel engines FAST!

Exide
BATTERIES
FOR CRANKING DIESEL ENGINES

THERE are many ways to speed up your output. A first essential when using Diesel power is fast, dependable cranking that helps to get the engine on the job as soon as its power is needed.

That's why Exide Batteries can speed up production. With their tremendous power, poured out freely even at low temperatures, and their consistently high voltage that insures the needed high cranking speed—Exides save valuable time in starting Diesel engines.

They save time and trouble day in and day out, during the entire long life that keeps their overall cost so low. There is an Exide for every size and type of Diesel engine, from the smallest to the largest. No job is too tough for an Exide. These batteries are helping to speed up output wherever Diesel engines are used. Why not write us today?

THE ELECTRIC STORAGE BATTERY CO., Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

You'd have to split a fine ink line!

Rugged, trouble-free . . . Foxboro Temperature Recorders are made for any range between −150° F. and +1000° F.

Even the thin ink-line made by a recording pen is far too wide to show the precision with which a Foxboro Temperature Recorder "feels" and records every variation in temperature. You would have to split the line to get readings as exact as the response of the sensitive bulb-and-capillary-tube measuring system in a Foxboro Instrument.

Such accuracy may not seem essential for your boiler-room or plant operations and equipment. Yet it gives you positive assurance that upward or downward trends in temperature can be detected before they go too far . . . that critical temperatures can be maintained within the narrowest limits.

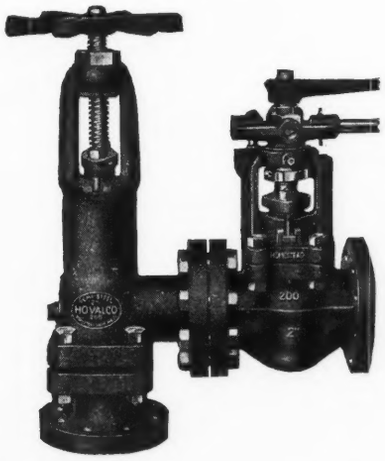
What's more, Foxboro Temperature Recorders furnish *continuous* records like this . . . show exactly what has happened every minute of the day! Frequently, they reveal just when important wastes have occurred . . . enable you to "track down" and eradicate costly losses.

Get the full story on these automatic "watchmen" for your operating temperatures. Write for Bulletin 198-2. **The Foxboro Company, 68 Neponset Avenue, Foxboro, Massachusetts, U. S. A.** Branches in principal cities of United States and Canada.

FOXBORO
REG. U. S. PAT. OFF.

TEMPERATURE RECORDERS

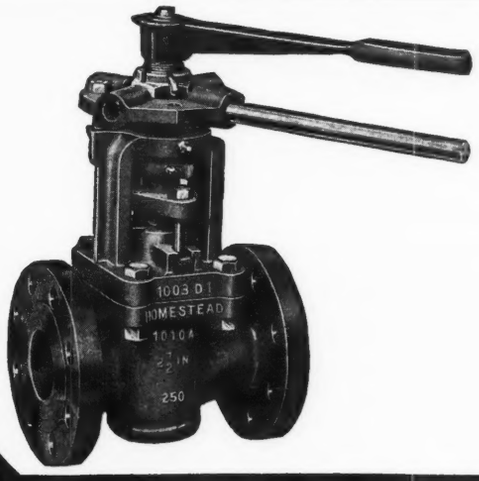
Three Ways TO GET VALVE SATISFACTION



Hovalco-Homestead Combination Boiler Blow-Off

● No greater satisfaction can come from a boiler blow-off valve than to know that when once installed it is going to last as long as the boiler itself. Here *is* an outstanding favorite in the power field—noted for long life, low cost service, with maximum safety. Spare seat and disc inside the Hovalco Angle Valve, plus protected seating surfaces of either of its quick opening companions—the "Lever-Seald" or "Cam-Seald" Plug Valves—assure this extremely long, low-cost service. Sizes 1½" to 2½"; semi-steel or cast steel for pressures to 600 pounds.

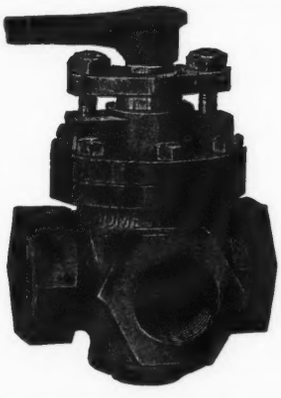
1



Homestead Lever-Seald Valves

● Here's a valve that positively cannot stick—opens or closes in quarter-turn—no lubrication required. Ends your valve worries on high temperature or high pressure services. Protected seating surfaces assure long life. Here's true "valve satisfaction" for a multitude of your tough valve jobs. Cast in semi-steel, steel, bronze, Monel, Ni-Resist, or acid resisting bronze; straightway, 3-way, or 4-way types for pressures up to 1500 pounds and corresponding temperatures.

2



3-Way and 4-Way Homestead Quarter-Turn Valves

● It's double economy and double satisfaction to use 3-way and 4-way Homestead Valves as flow-changers, or to control single or double-acting hydraulic pistons which travel their full stroke. You save in first cost, maintenance and operating time by requiring fewer valves and fittings. You save by getting Homestead's typical long, trouble-free, and extremely low cost per year operation. Made in "Lever-Seald" and "Cam-Seald" types for a wide range of temperature, pressure, and fluid conditions.

3

Ask for Reference Book No. 38 showing complete Homestead line; and for special prices on your quantity valve requirements.

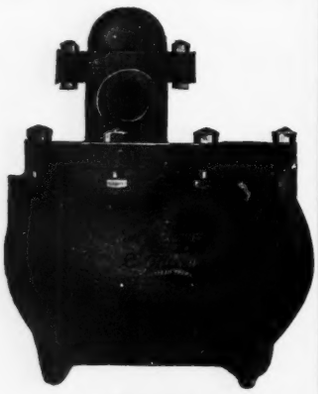
Homestead Valve Mfg. Co.

P. O. Box 210 **Coraopolis, Penna.**

For Genuine Satisfaction

CHOOSE

THE GENUINE



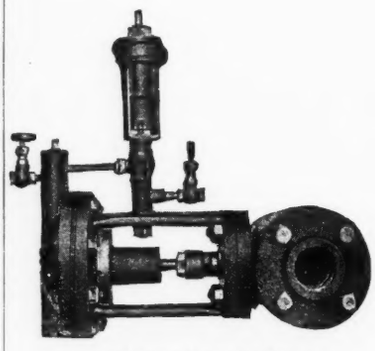
TRAPS

Squires traps have held a reputation for long lived service and genuine reliability for years. The latest in engineering improvements are constantly being consolidated into these units to meet modern operating conditions.

Squires

• Power engineers who demand the maximum in operating efficiency and long lived service choose Squires Steam Specialties for their most exacting jobs. They *know* that Squires equipment is of sound design, good manufacture, and requires little maintenance over years of use. Easy to adjust or repair, Squires Steam Specialties have maintained high standards of quality for nearly four decades—why not let us give you a more complete story?

Write for literature and prices *today!!*



REDUCING VALVES

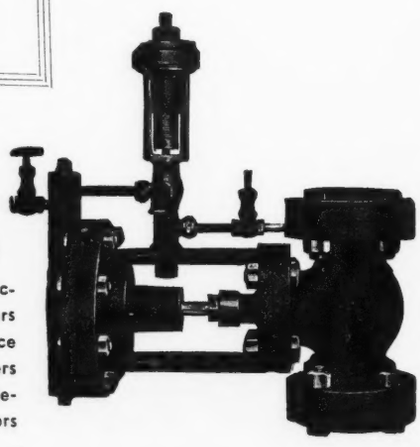
Reducing pressure from 500 lbs. to 1 oz. in one stage — that's what simple, sturdy, reliable Squires Reducing Valves can do, if needs be. This positive dead end valve may be thermostatically operated.

FEED WATER CONTROLLERS

Be sure your boiler feed follows demand closely — install Squires Feed Water Controllers. They're simple and trouble-free, and will hold water level at exact gauge. Used the world over on all types of boilers.

PUMP GOVERNORS

Sensitive and positive in action, Squires Pump Governors give exceptionally long service without attention. Engineers pronounce them the most dependable pump governors they ever used.



WRITE FOR THE BULLETINS

THE C. E. SQUIRES COMPANY

EAST 40TH and KELLEY AVE. • CLEVELAND, OHIO

HOW Industrial Cleveland Squeezes EXTRA Power from Its Steam

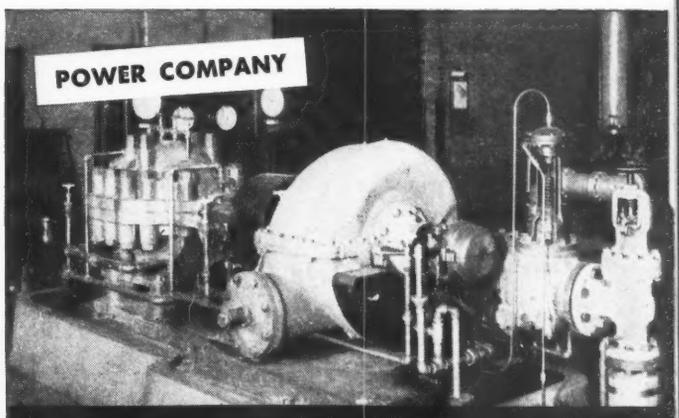
with G-E Mechanical-drive Turbines

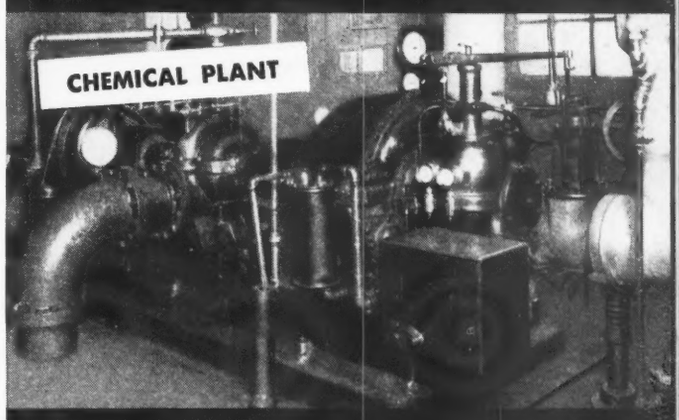
AS A USER OF STEAM, you'll be interested in the "squeeze plays" Cleveland industrial plants are applying to their steam systems to get additional power. Note the wide variety of applications. In the Cleveland area alone there are scores of G-E mechanical-drive turbines using available steam to drive pumps, fans, compressors, blowers, pulverizers, stokers.

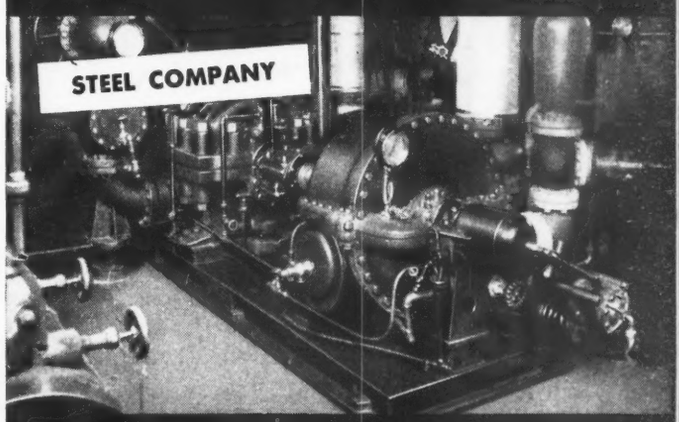
Two Ways That Turbines Get "Extra" Power

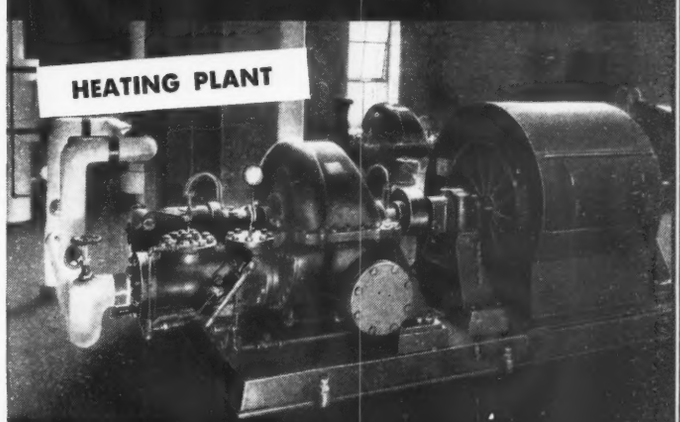
1. They do double duty—G-E turbines, as reducing valves, provide clean, low-pressure steam, and at the same time produce by-product mechanical power.

2. They utilize waste steam -- G-E turbines are built to get energy out of steam which you may be exhausting to atmosphere.

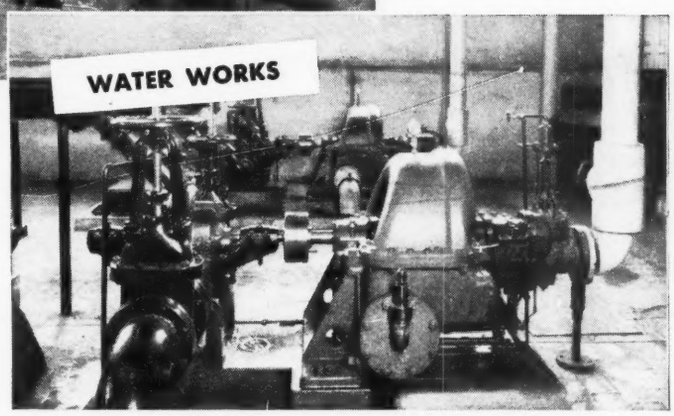






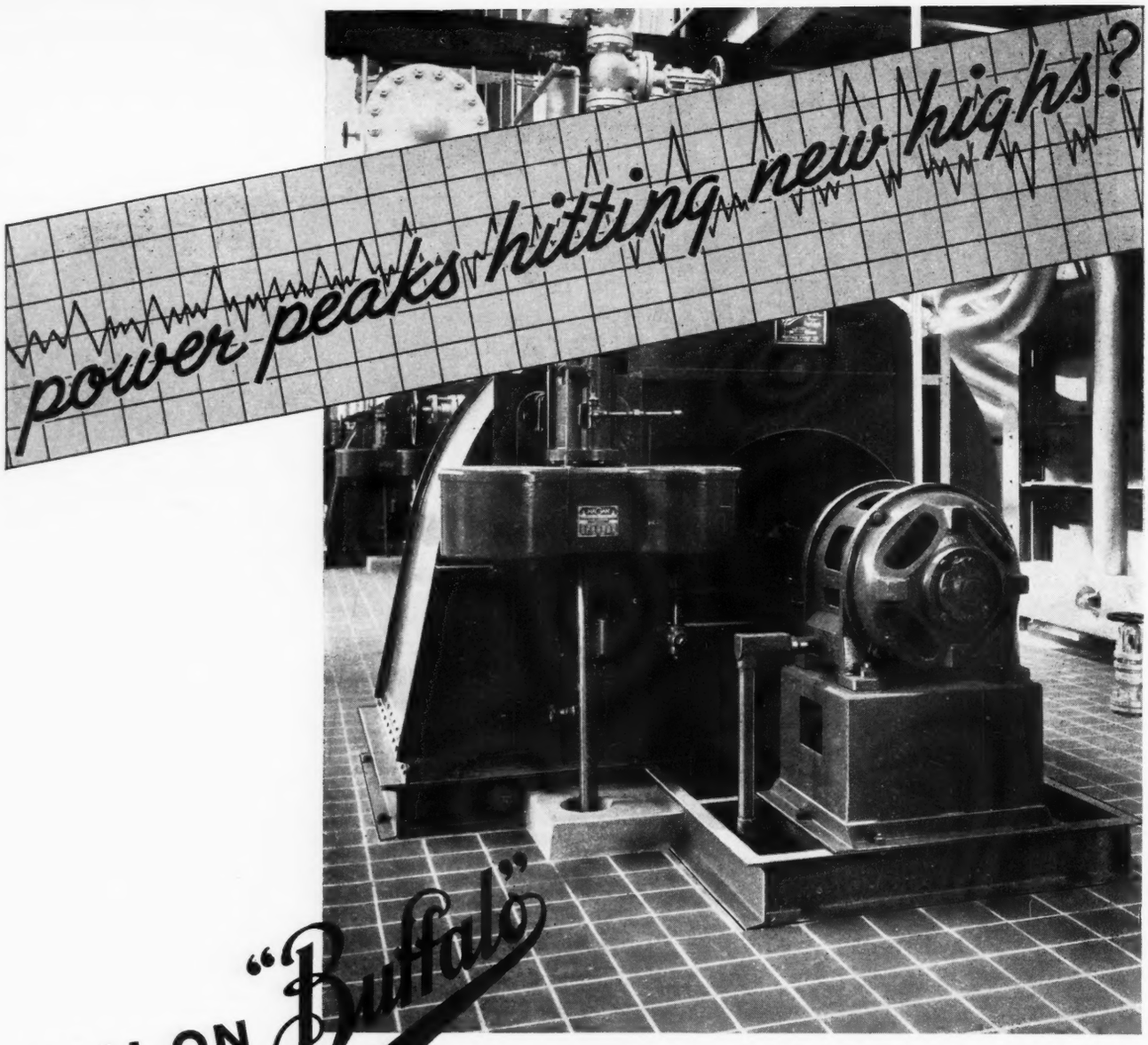


Ask our local turbine specialist to show how G-E mechanical-drive turbines can produce extra power for you. You may be able to save thousands of dollars. General Electric Company, Schenectady, New York.



GENERAL ELECTRIC

252-1



CALL ON "Buffalo"

At a moment's notice, Buffalo Forced and Induced Draft Fans swing into action with stamina to spare to meet the severest demands of peak loads. In the span of a few seconds time, pressures build up, generators hum with increased power. It's just part of the day's work for Buffalo Fans—and you can depend on them to carry on dependably for years and years of service. That's why so many power companies and industrial power plants standardize on Buffalo Fans for this all-important job—and save operating costs in the bargain.

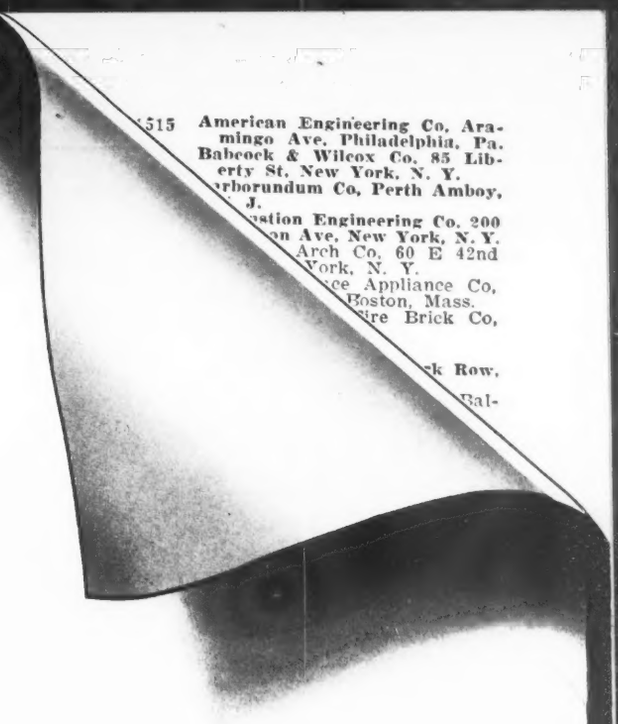
Better write for Bulletins on Buffalo Forced and Induced Draft Fans. Check the details of their structural superiority.

BUFFALO FORGE COMPANY

488 Broadway **Buffalo, N. Y.**

Branch Engineering Offices in Principal Cities
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo" MECHANICAL DRAFT FANS


515 American Engineering Co, Aramingo Ave, Philadelphia, Pa.
Babcock & Wilcox Co, 85 Liberty St, New York, N. Y.
rborundum Co, Perth Amboy, J.
stion Engineering Co, 200 on Ave, New York, N. Y.
Arch Co, 60 E 42nd York, N. Y.
ce Appliance Co, Boston, Mass.
ire Brick Co,
k Row,
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POWER

1941 DIRECTORY OF MANUFACTURERS

A Buyers' Guide of over 400 power products, and who makes each

How to use this directory—Look for the noun in the product name, for example: "Strainers, oil", not "Oil strainers"; "Accumulators, steam", not "Steam accumulators". The directory is freely cross-indexed to help locate the item you are looking for

Company names are classified alphabetically under the product headings; those advertising in this issue of POWER are in boldface type and under each of these listings appear page numbers of advertisements giving additional product information

AC GENERATORS
(See Generators, Electric)

AC MOTORS
(See Motors, Electric)

ACCUMULATORS, STEAM
Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 24-25
Koppers Co, Pittsburgh, Pa.
Republic Flow Meters Co, 2222 Diversey Pkway, Chicago, Ill.
Adv pages 171, 176, 192, 221

ADSORBERS, ODOR
Dorex Div, W B Connor Engrg Corp, 114 E 32nd St, New York, N. Y.

AFTERCOOLERS
(See Heat Exchangers)

AIR COMPRESSORS
(See Compressors)

AIR-CONDITIONING SYSTEMS
(See Also Refrigerating Systems)
American Blower Corp, 6000 Russell St, Detroit, Mich.
Buffalo Forge Co, 488 Broadway, Buffalo, N. Y.
Adv page 160
Carrier Corp, Syracuse, N. Y.
Clarage Fan Co, 621 Porter St, Kalamazoo, Mich.
Adv page 147
Dunham, C A, Co, 450 E Ohio St, Chicago, Ill.
Fairbanks, Morse & Co, 600 S Michigan Ave, Chicago, Ill.
Fedders Mfg Co, 63 Tonawanda St, Buffalo, N. Y.
Adv page 187
Frick Co, 325 Broadway, Waynesboro, Pa.
Adv page 140
General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
Ingersoll-Rand Co, 11 Broadway, New York, N. Y.
Adv pages 38-39
Kirk & Blum Mfg Co, 2831 Spring Grove Ave, Cincinnati, Ohio
Minneapolis - Honeywell Regulator Co, 4490 Wayne Ave, Philadelphia, Pa.
McQuay Inc, Minneapolis, Minn.
Niagara Blower Co, Buffalo, N. Y.
Research Corp, 405 Lexington Ave, New York, N. Y.
Ross Heater & Mfg Co, 1409 West Ave, Buffalo, N. Y.
Schubert-Christy Corp, 1600 Georgia St, Affton Station, St Louis, Mo.
Skinner Heating & Ventilating Co, 1990 N 9th, St Louis, Mo.
Staynew Filter Corp, Rochester, N. Y.
Adv page 241
Surface Combustion Corp, Sieloff St, Toledo, Ohio
Trane Co, 2012 Cameron Ave, La Crosse, Wis.
Vilter Mfg Co, 2217 S 1st St, Milwaukee, Wis.
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53
Worthington Pump & Machinery Corp, Harrison, N. J.
York Ice Machry Corp, York, Pa.

AIR HEATERS
(See Preheaters, Air)

ALARM SYSTEMS, FIRE
(See Sprinkler Systems, Fire)

ALARM SYSTEMS, FLAME FAILURE
Bailey Meter Co, 1036 Ivanhoe Rd, Cleveland, Ohio
Adv page 173
Brown Instrument Co, 4490 Wayne Ave, Philadelphia, Pa.
Adv pages 141, 182, 190, 202, 211
Ess Instrument Co, 30 Irving Place, New York, N. Y.
Wheelco Instruments Co, 1929 S Halstead Ave, Chicago, Ill.
Adv page 162

ALARMS, LOW-WATER
(See Water Columns)

ALLOYS, METALS FOR SPECIAL SERVICE
Allegheny Ludlum Steel Corp, Pittsburgh, Pa.
American Brass Co, Waterbury, Conn.
Adv page 115
American Manganese Steel Div, American Brake Shoe & Foundry Co, 397 E 14th St, Chicago, Ill.
Duriron Co, Inc, Dayton, Ohio
Electro Refractories & Alloys Corp, Andrews Bldg, Buffalo, N. Y.
Haynes Stellite Co, 30 E 42nd St, New York, N. Y.
International Nickel Co, 67 Wall St, New York, N. Y.
Adv pages 10, 123
Lukens Steel Co, Coatesville, Pa.
Meehanite Metal Corp, Dept A, 311 Ross St, Pittsburgh, Pa.
Mueller Brass Co, 1925A Lapeer Ave, Port Huron, Mich.
National Lead Co, 111 Broadway, New York, N. Y.
Phelps Dodge Copper Products Corp, 40 Wall St, New York, N. Y.
Revere Copper & Brass, Inc, 230 Park Ave, New York, N. Y.
Adv page 103
Scovill Mfg Co, 99 Mill St, Waterbury, Conn.

ALUMINUM PAINT
(See Paint, Aluminum)

AMMETERS
Bristol Co, Waterbury, Conn.
Columbia Electric Mfg Co, 4519 Hamilton Ave, Cleveland, Ohio
Esterline-Angus Co, Box 596, Indianapolis, Ind.
General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
Roller-Smith Co, 1766 W Market St, Bethlehem, Pa.
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53
Weston Electrical Instrument Corp, 614 Frelinghuysen Ave, Newark, N. J.
Adv pages 163, 210

AMMONIA VALVES
(See Valves, Ammonia)

ANALYZERS, GAS
(See Gas Analyzers)

ANEMOMETERS
Friez, Julien P, & Sons, 4 [illegible] Central Ave, Baltimore, Md.
Taylor Instrument Cos, Rochester, N. Y.
Adv page 235

ARC-WELDING EQUIPMENT
(See Welding Equipment)

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American Arch Co, 68 E 42nd St, New York, N. Y.
Babcock & Wilcox Co, 85 Liberty St, New York, N. Y.
Adv pages 4-5
Bernitz Furnace Appliance Co, 89 Broad St, Boston, Mass.
Bigelow Co, 200–220 River St, New Haven, Conn.
Bigelow-Liptak Corp, 2840 W Grand Blvd, Detroit, Mich.
Carborundum Co, Dept P, Perth Amboy, N. J.
Chicago Fire Brick Co, 1463 Elston Ave, Chicago, Ill.
DeWolf Furnace Corp, 77 South Ave, Rochester, N. Y.
Adv page 223
Green, A P, Firebrick Co, 1020 Breckenridge, Mexico, Mo.
Harbison-Walker Refractories Co, 1800 Farmers Bank Bldg, Pittsburgh, Pa.
McLeod & Henry Co, Inc, 31 Monroe St, Troy, N. Y.
Plibrico Jointless Firebrick Co, 1818 Kingsbury, Chicago, Ill.
Ramtite Co, 2563 W 18th St, Chicago, Ill.
Reintjes, Geo P, Co, 2517 Jefferson, Kansas City, Mo.
Wickes Boiler Co, 502 N Water St, Saginaw, Mich.

ASBESTOS PRODUCTS
(See Also Boards, Insulation, Pipe and Packing)
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Adv pages 162, 167, 189
Carey, Philip, Co, Lockland, O.
Adv page back cover
Ehret Magnesia Mfg Co, Inc, Valley Forge, Pa.
Adv page 231
Johns-Manville, 22 E 40th St, New York, N. Y.
Adv pages 36-37
Keasbey & Mattison Co, Butler Pike, Ambler, Pa.
Adv page 150
Standard Asbestos Mfg Co, 820 West Lake St, Chicago, Ill.
Union Asbestos & Rubber Co, 1821 S 54th Ave, Cicero, Ill.

ASH-HANDLING EQUIPMENT
(See Conveyors, Sluices, Storage)

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(See Valves, Balanced)

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Adv page 156
Friez, Julien P, & Sons, 4 N Central Ave, Baltimore, Md.
Tagliabue, C J, Mfg Co, Park & Nostrand Aves, Brooklyn, N. Y.
Taylor Instrument Cos, Rochester, N. Y.
Adv page 235
Uehling Instrument Co, 470 Getty Ave, Paterson, N. J.

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Alexander Bros, 410 N 3rd St, Philadelphia, Pa.
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Ideal Commutator Dresser Co, 1025 Park Ave, Sycamore, Ill.
Littleford Bros, 457 E Pearl St, Cincinnati, Ohio
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Edison, Thomas A, Inc, West Orange, N. J.
Electric Storage Battery Co, Allegheny Ave & 19th St, Philadelphia, Pa.
Adv page 155
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
Philadelphia Storage Battery Co, Ontario & C Sts, Phila, Pa.
U.S.L. Battery Corp, Niagara Falls, N. Y.
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Link-Belt Co, 519 N Holmes Ave, Indianapolis, Ind.
Adv page 3
McGill Mfg Co, 270 Indiana Ave, Valparaiso, Ind.
Medart Co, 3548 De Kalb St, St. Louis, Mo.
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Nice Ball Bearing Co, 30th & Nicetown Lane, Philadelphia, Pa.
Norma-Hoffman Bearings Corp, Stamford, Conn.
Royersford Foundry & Machine Co, 75 Main, Royersford, Pa.
Shafer Bearing Corp, 35 E Wacker Drive, Chicago, Ill.
SKF Industries, Inc, Front St & Erie Ave, Philadelphia, Pa.
Standard Pressed Steel Co, Jenkintown, Pa.
Adv pages 163, 185
Stephens-Adamson Mfg Co, 5 Ridgeway Ave, Aurora, Ill.
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Goodrich, B F, Co, 460 S Main St, Akron, Ohio
Lignum-Vitae Products Corp, Jersey City, N. J.
Nolu Oilless Bearing Co, 16 E Johnson, Philadelphia, Pa.
Rhoades, R W, Metaline Co, 50–19 5th St, Long Island City, N. Y.

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Chrysler Corp, Amplex Div, P O Box 2718, Detroit, Mich.
Johnson Bronze Co, New Castle, Pa.
Kingsbury Machine Works, Inc, 4324 Tackawanna St, Phila, Pa.
Link-Belt Co, 2410 W 18th St, Chicago, Ill.
Adv page 3
Magnolia Metal Co, 120 Bay Way, Elizabeth, N. J.
Saginaw Bearing Co, 825 S Water St, Saginaw, Mich.
Wood's, T B, Sons Co, 1165 5th Ave, Chambersburg, Pa.

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Adv page 3
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(See Conveyors)

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(See Dressing, Belt)

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(See Lacing, Belt)

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Goodrich, B F, Co, 460 S Main St, Akron, Ohio
Goodyear Tire & Rubber Co, 1144 E Market St, Akron, Ohio
Link-Belt Co, 300 W Pershing Rd, Chicago, Ill.
Adv page 3
Manhattan Rubber Mfg Div, 94 Townsend St, Passaic, N. J.
Manheim Mfg & Belting Co, 375 Steigel St, Manheim, Pa.
New York Belting & Packing Co, Passaic, N. J.
Quaker City Rubber Co, Comly & Milnor Sts, Philadelphia, Pa.
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Robins Conveying Belt Co, Passaic, N. J.
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Stanley Belting Corp, 15 N Jefferson St, Chicago, Ill.
Stephens-Adamson Mfg Co, 5 Ridgeway Ave, Aurora, Ill.
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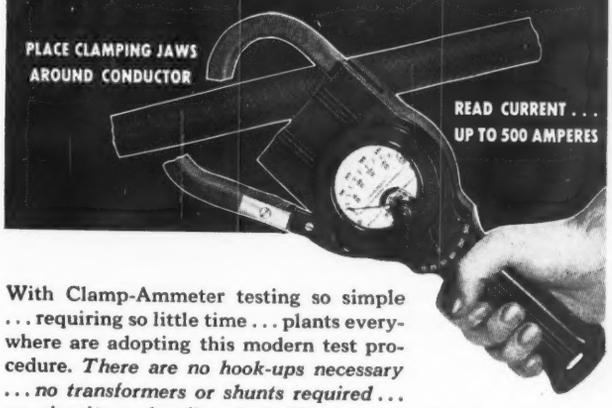

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Adv pages 11, 18-19, 107, 256
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Robins Conveying Belt Co, Passaic, N. J.
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Adv pages 186, 192, 206, 214
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Adv pages 164, 188, 191, 203
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Adv page 138
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Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
American Blower Corp, 6000 Russell St, Detroit, Mich.
American Coal Burner Co, E Superior St, Chicago, Ill.
Adv page 47
Bayley Blower Co, 1817 S 66th St, Milwaukee, Wis.
Breuer Electric Mfg Co, 5100 N Ravenswood Ave, Chicago, Ill.
Buffalo Forge Co, 488 Broadway, Buffalo, N. Y.
Adv page 160
Carling Turbine Blower Co, 25 St John's Rd, Worcester, Mass.
Champion Blower & Forge Co, Lancaster, Pa.
Clarage Fan Co, 621 Porter St, Kalamazoo, Mich.
Adv page 147
Coppus Engrg Corp, 350 Park Ave, Worcester, Mass.
De Laval Steam Turbine Co, Trenton, N. J.
Adv pages 50, 201
Eclipse Fuel Engineering Co, 707 S Main St, Rockford, Ill.
Elliott Co, Jeannette, Pa.
Adv pages 6-7
Erie Electric Co, 124 Church St, Buffalo, N. Y.
Adv page 212
Garden City Fan Co, 332 S Michigan Ave, Chicago, Ill.
General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 139, 226
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
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Adv pages 38-39
Janette Mfg Co, 556 W Monroe St, Chicago, Ill.
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Adv page 164

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Adv pages 8-9
General Specialty Co, Inc, 67 Carroll St, Buffalo, N. Y.
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Adv page 172
Marion Machine Foundry & Supply Co, Marion, Ind.
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(See Printing Machines)

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Standard Asbestos Mfg Co, 820 W Lake St, Chicago, Ill.

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Adv page 173
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Adv pages 141, 182, 190, 202, 211
Foxboro Co, 38 Neponset Ave, Foxboro, Mass.
Adv page 156
Lonergan, J E, Co, Race St, Phila, Pa.
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Adv pages 171, 176, 192, 221
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Adv page 35

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(See Water Treatment, Softeners)

BOILER-TUBE CLEANERS

(See Cleaners, Boiler-Tube)

BOILER TUBES

(See Tubes, Boiler)

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Adv pages 40-41, 121, 159, 226
Hynes Electric Heating Co, 240 Cherry St, Philadelphia, Pa.
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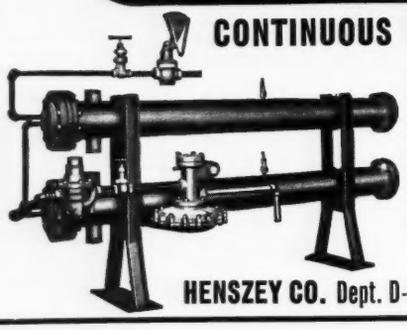

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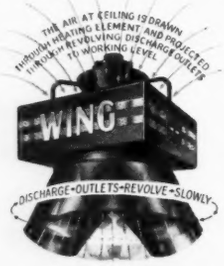
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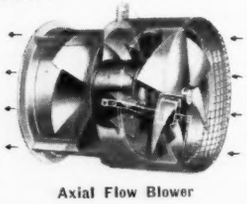

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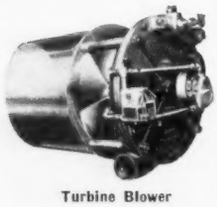

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Murray Iron Works Co, Burlington, Iowa
Adv page 46
Sims Co, Erie, Pa.

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Brownell Co, 301 N Findlay St, Dayton, Ohio
Cleaver-Brooks Co, 3120 W Center St, Milwaukee, Wis.
Adv page 239
Combustion Engrg Co, Inc, 206 Madison Ave, New York, N. Y.
Adv pages 42-43
Eclipse Fuel Engrg Co, 707 S Main St, Rockford, Ill.
Erie City Iron Works, 1422 East Ave, Erie, Pa.
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Hodge Boiler Works, East Boston, Mass.
Keeler, E, Co, Williamsport, Pa.
Adv page 117
Kewanee Boiler Corp, Kewanee, Ill.
Kroeschell Boiler Co, Racine, Wis.
Lookout Boiler & Mfg Co, Chattanooga, Tenn.
Adv pages 24-25
Mears-Kane-Ofeldt, Inc, Philadelphia, Pa.
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Adv page 46
Pacific Steel Boiler Div, U. S. Radiator Corp, 1056 National Bank Bldg, Detroit, Mich.
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Titusville Iron Works Co, Titusville, Pa.
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Adv page 217
Webster, Howard J, Greene & Hortter Sts, Philadelphia, Pa.
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Adv pages 4-5
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(High-pressure series boiler)
Bigelow Co, 200-220 River St, New Haven, Conn.
Bros, Wm, Boiler & Mfg Co, Nicollet Id, Minneapolis, Minn.
Combustion Engrg Co, Inc, 206 Madison Ave, New York, N. Y.
Adv pages 42-43
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Erie City Iron Works, 1422 East Ave, Erie, Pa.
Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 24-25
International Boiler Works Co, E Stroudsburg, Pa.
Keeler, E, Co, Williamsport, Pa.
Adv page 117
Keeler, Godfrey, Co, Inc, 77 Warren St, New York, N. Y.
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Murray Iron Works Co, Burlington, Iowa
Adv page 46
Nagle Engine & Boiler Works, Erie, Pa.
Page Boiler Co, 815 W Webster Ave, Chicago, Ill.
Riley Stoker Corp, 999 Neponset St, Worcester, Mass.
Adv pages 88-89
Springfield Boiler Co, 1903 E Capitol Ave, Springfield, Ill.
Titusville Iron Works Co, Titusville, Pa.
Union Boiler & Mfg Co, Lebanon, Pa.
Union Iron Works, Erie, Pa.
Vogt, Henry, Machine Co, 1000 W Ormsby St, Louisville, Ky.
Adv page 217
Wickes Boiler Co, 502 N Water St, Saginaw, Mich.

BOILERS, WASTE-HEAT

Babcock & Wilcox Co, 85 Liberty St, New York, N. Y.
Adv pages 4-5
Combustion Engrg Co, Inc, 206 Madison Ave, New York, N. Y.
Adv pages 42-43
Edge Moor Iron Works, 30 Rockefeller Plaza, New York, N. Y.
Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 24-25
Murray Iron Works Co, Burlington, Iowa
Adv page 46
Riley Stoker Corp, 999 Neponset St, Worcester, Mass.
Adv pages 88-89
Springfield Boiler Co, 1903 E Capitol Ave, Springfield, Ill.
Vogt, Henry, Machine Co, 1000 W Ormsby St, Louisville, Ky.
Adv page 217

BREAKERS, CIRCUIT, AIR

Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
I-T-E Circuit Breaker Co, 19th & Hamilton St, Phila, Pa.
Roller-Smith Co, 1766 W Market St, Bethlehem, Pa.
Adv pages 171, 178, 186, 193,
Square D Co, Rivard & Piquette Sts, Detroit, Mich.
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53

BREAKERS, CIRCUIT, OIL

Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
Delta-Star Electric Co, Fulton St, Chicago, Ill.
General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
Pacific Electric Mfg Corp, 5815 3rd St, San Francisco, Calif.
Roller-Smith Co, 1766 W Market St, Bethlehem, Pa.
Southern States Equipment Corp, Birmingham, Ala.
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Adv pages 52-53

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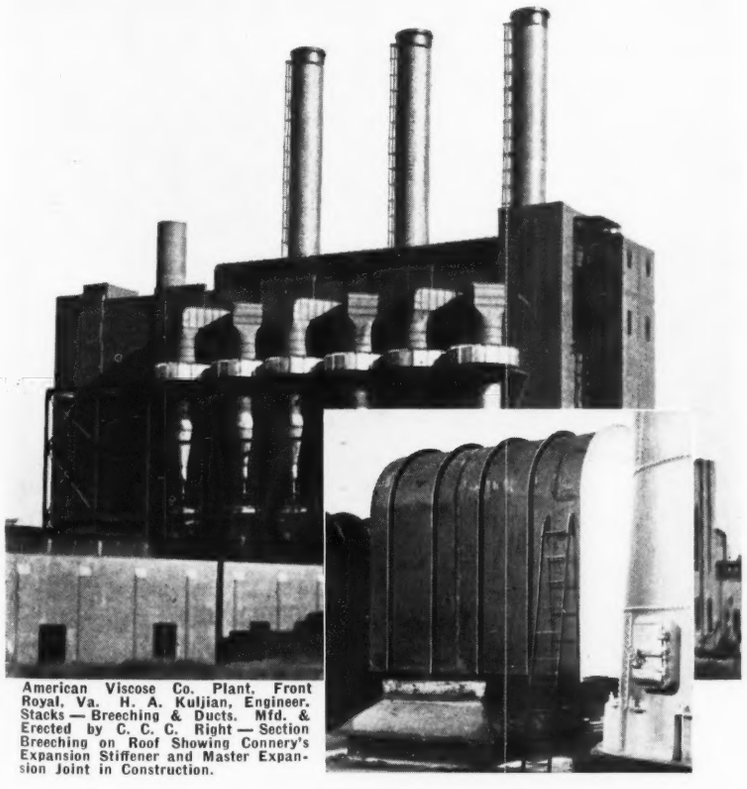
Bros, Wm, Boiler & Mfg Co, Nicollet Id, Minneapolis, Minn.
Brownell Co, 301 N Findlay St, Dayton, Ohio



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Central Illinois Public Service Co., Hutsonville, Ill.
United Illuminating Corp., New Haven, Conn.
Phelps Dodge Corp., Douglas, Ariz.
Calvert Distilling Co., St. Denis, Md.
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Chicago Bridge & Iron Co, 2454 McCormick Bldg, Chicago, Ill.
Colonial Iron Works Co, 17643 St Clair Ave, Cleveland, Ohio
Connery Construction Co, 2nd & Luzerne Sts, Phila, Pa.
Adv page 165
Dover Boiler Works, 90 E Dickerson St, Dover, N. J.
Gifford-Wood Co, 24 Hill St, Hudson, N. Y.
Graver Tank & Mfg Co, Inc, East Chicago, Ind.
Green Fuel Economizer Co, Inc, 627 Main St, Beacon, N. Y.
Hodge Boiler Works, East Boston, Mass.
International Engrg Works, Inc, Framingham, Mass.
Keeler, E, Co, Williamsport, Pa.
Adv page 117
Kirk & Blum Mfg Co, 2831 Spring Grove Ave, Cincinnati, Ohio
Munro, R, & Sons Mfg Corp, 23rd St, Pittsburgh, Pa.
Portland Co, Portland, Maine
Richmond Engrg Co, 7th & Hospital Sts, Richmond, Va.
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Young & Bertke Co, 1040 W Hulbert Ave, Cincinnati, O.
Youngstown Steel Tank Co, Youngstown, Ohio

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Babcock & Wilcox Co, 85 Liberty St, New York, N. Y.
Adv pages 4-5
Bernitz Furnace Appliance Co, 89 Broad St, Boston, Mass.
Bigelow-Liptak Corp, 2840 W Grand Blvd, Detroit, Mich.
Brooklyn Fire Brick Works, 88 Van Dyke St, Brooklyn, N. Y.
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DeWolf Furnace Corp, 77 South Ave, Rochester, N. Y.
Adv page 223
General Refractories Co, 1600 Real Estate Trust Bldg, Philadelphia, Pa.
Green, A P, Fire Brick Co, 1020 Breckenridge, Mexico, Mo.
Hammond Fire Brick Co, Fairmont, W. Va.
Harbison-Walker Refractories Co, 1800 Farmers Bank Bldg, Pittsburgh, Pa.
Illinois Clay Products Co, Joliet, Ill.
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McLeod & Henry Co, Inc, 31 Monroe St, Troy, N. Y.
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Quigley Co, 56 W 45th St, New York, N. Y.
Adv page 202
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Harbison-Walker Refractories Co, 1800 Farmers Bank Bldg, Pittsburgh, Pa.
Johns-Manville, 22 E 40th St, New York, N. Y.
Adv pages 36-37
Laclede-Christy Clay Products Co, 411 N 7th Street, St Louis Mo.
Mexico Refractories Co, Mexico, Mo.
Quigley Co, Inc, 56 W 45th St, New York, N. Y.
Adv page 202

BRINE COOLERS

(See Coolers, Brine)

BRUSHES, MOTOR, GENERATOR

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Adv page 238
National Carbon Co, Carbon Sales Div, Cleveland, Ohio
Ohio Carbon Co, Cleveland, Ohio
Speer Carbon Co, 40 Theresia St, Saint Marys, Pa.
U. S. Graphite Co, 1621 Holland Ave, Saginaw, Mich.

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Allen-Sherman-Hoff Co, 227 S 15th St, Philadelphia, Pa.
Bartlett & Snow, C O, Co, Cleveland, Ohio
Adv page 151
Bethlehem Steel Co, Bethlehem, Pa.
Brady Conveyors Corp, 20 W Jackson Blvd, Chicago, Ill.
Caldwell, W E, Co, Inc, 280 Brandeis St, Louisville, Ky.
Chain Belt Co, 1674 W Bruce St, Milwaukee, Wis.
Chattanooga Boiler & Tank Co, Box 110, Chattanooga, Tenn.
Colonial Iron Works Co, 17643 St Clair Ave, Cleveland, Ohio
Connery Construction Co, 2nd & Luzerne Sts, Phila, Pa.
Adv page 165
Fairfield Engrg Co, 305 Barnhart St, Marion, Ohio
Frederick Iron & Steel Co, Frederick, Md.
Gifford-Wood Co, 24 Hill St, Hudson, N. Y.
Hahn Engrg Co, 30 Church St, New York, N. Y.
Adv page 172
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Robins Conveying Belt Co, Passaic, N. J.
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Adv page 166
Chicago Flexible Shaft Co, Chicago, Ill.
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Coppus Engrg Corp, 350 Park Ave, Worcester, Mass.
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Babcock & Wilcox Co, 85 Liberty St, New York, N. Y.
Adv pages 4-5
Best, W N, Engrg Co, 90 West St, New York, N. Y.
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Coen Co, 40 Boardman Place, San Francisco, Calif.
Combustion Equipment Co, 1820 Cherry St, Kansas City, Mo.
Coppus Engineering Corp, 350 Park Ave, Worcester, Mass.
Davison Combustion Co, 2939 Smallman St, Pittsburgh, Pa.
Engineer Co, 75 West St, New York, N. Y.
Johnson, S T, Co, Oakland, Calif.
Peabody Engrg Corp, 580 5th Ave, New York, N. Y.
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Babcock & Wilcox Co, 85 Liberty St, New York, N. Y.
Adv pages 4-5
Best, W N, Engrg Co, 90 West St, New York, N. Y.
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Cashin, W D Co, 69 A St, Boston, Mass.
Chicago Flexible Shaft Co, Chicago, Ill.
Coen Co, 40 Boardman Place, San Francisco, Calif.
Combustion Engrg Co, Inc, 206 Madison Ave, New York, N. Y.
Adv pages 42-43
Combustion Equipment Co, 1820 Cherry St, Kansas City, Mo.
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Enterprise Oil Burner Co, 2902 19th St, San Francisco, Cal.
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Hagan, George J, Co, Pittsburgh, Pa.
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Riley Stoker Corp, 999 Neponset St, Worcester, Mass.
Adv pages 88-89
Rockwell, W S, Co, 50 Church St, New York, N. Y.
Adv page 146
Schutte & Koerting Co, 12th & Thompson Sts, Philadelphia, Pa.
Simplex Oil Heating Corp, 21 West St, New York, N. Y.
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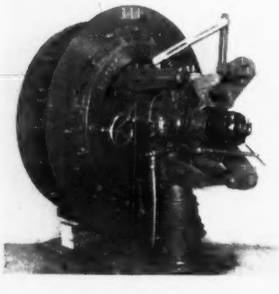

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Adv pages 4-5
Combustion Engrg Co, Inc, 206 Madison Ave, New York, N. Y.
Adv pages 42-43
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Adv page 150
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Adv page 202
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Adv pages 4-5
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Adv pages 189, 203
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Baldwin-Duckworth Chain Corp, Springfield, Mass.
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Bond, Charles, Co, 617-623 Arch St, Philadelphia, Pa.
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Spencer Turbine Co, 488 New Park Ave, Hartford, Conn.
Sturtevant, B F, Co, 47 Readville St, Hyde Park, Boston, Mass.
United Conveyor Corp, Dearborn & Van Buren Sts, Chicago, Ill.
U. S. Hoffman Machinery Corp, 105 4th Ave, New York, N. Y.

CLOCKS, PROGRAM

(See Controllers, Time-Cycle)

CLOTH, ASBESTOS

(See Asbestos Products)

CLUTCHES, AUTOMATIC

American Clutch Equipment Co, Clifton, N. J.
Automatic Clutch Co, Chicago, Ill.
Dawes Equipment, Inc, 2280 Penobscot Bldg, Detroit, Mich.
Dickson Automatic Clutch Co, Los Angeles, Calif.
Fast, Gustav, Engrg Co, Annapolis, Md.
Madden, J P, Bethlehem, Pa.
Washburn Shops, Worcester, Mass.

CLUTCHES, FRICTION

Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
Brown Engineering Co, 119 E 3rd St, Reading, Pa.
Adv page 202
Caldwell, W E, Co, Inc, 280 Brandeis St, Louisville, Ky.
Carlyle Johnson Machine Co, 52 Main St, Manchester, Conn.
Chain Belt Co, 1674 W Bruce St, Milwaukee, Wis.
Conway Clutch Co, Cincinnati, O.
Dodge Mfg Corp, Mishawaka, Ind.
Falls Clutch & Machinery Co, Cuyahoga Falls, Ohio.
Foote Bros Gear & Machine Co, Western Blvd, Chicago, Ill.
Gifford-Wood Co, 24 Hill St, Hudson, N. Y.
Hill Acme Co, 6400 Breakwater Ave, Cleveland, Ohio
Hilliard Corp, 4 W 4th St, Elmira, N. Y.
Johnson, Carlyle, Machine Co, 52½ Main St, Manchester, Conn.
Jones, W A, Foundry & Machine Co, 4423 W Roosevelt Rd, Chicago, Ill.
Kinney Mfg Co, 3529 Washington St, Boston, Mass.
Link-Belt Co, 300 W Pershing Road, Chicago, Ill.
Adv page 3
McMahon & Co, Worcester, Mass.
Medart Co, 3548 DeKalb St, St. Louis, Mo.
Moore & White Co, Philadelphia, Pa.
Morse Chain Co, Ithaca, N. Y.
Adv page 3rd cover
Murray, D J, Mfg Co, Wausau, Wis.
Ramsey Chain Co, Inc, 1010 Broadway, Albany, N. Y.
Rockford Drilling Machine Div, Borg-Warner Corp, 114 Catherine St, Rockford, Ill.
St Regis Paper Co, Engrg & Mach Div, Mitchell St, Oswego, N. Y.
Spicer Mfg Corp, Toledo, Ohio.
Sprout, Waldron & Co, Muncy, Pa.
Stephens-Adamson Mfg Co, 5 Ridgeway Ave, Aurora, Ill.
Twin Disc Clutch Co, Racine, Wis.
Watson-Flagg Machine Co, Paterson, N. J.
Wood's, T B, Sons Co, 1165 5th Ave, Chambersburg, Pa.

CLUTCHES, MAGNETIC

Cutler-Hammer, Inc, 606 N 12th St, Milwaukee, Wis.
Adv page 99
Dings Magnetic Separator Co, Milwaukee, Wis.
Stearns Magnetic Mfg Co, Milwaukee, Wis.

CLUTCHES, OVERRUNNING

Hilliard Corp, 4 W 4th St, Elmira, N. Y.
Morse Chain Co, Ithaca, N. Y.
Adv page 3rd cover

COAL

Appalachian Coals, Inc, Cincinnati, Ohio.
Berwind-White Coal Mining Co, 1 Broadway, New York, N. Y.
Chesapeake & Ohio Railway, Terminal Tower, Cleveland, Ohio.
Adv page 152
Consolidation Coal Co, 30 Rockefeller Plaza, New York, N. Y.
General Coal Co, 2500 Fidelity-Philadelphia Trust Bldg, Philadelphia, Pa.
Adv page 233
Koppers Coal Co, Pittsburgh, Pa.
North American Coal Co, Cleveland, Ohio.
Peale, Peacock & Kerr, 420 Lexington Ave, New York, N. Y.
Pennsylvania Coal & Coke Corp, 70 E 45th St, New York, N. Y.
Pittsburgh Coal Co, Pittsburgh, Pa.
Valley Camp Coal Co, Western Reserve Bldg, Cleveland, Ohio.

COAL METERS

(See Meters, Coal)

COATINGS, BOILER DRUM AND TUBES

Dampney Co of America, 1243 River St, Hyde Park, Mass.
Huyette, Paul B, Co, Inc, 403 N Broad St, Phila, Pa.
Adv page 138

COATINGS, HEAT-, CORROSION RESISTANT

Cheesman-Elliot Co, 647 Kent Ave, Brooklyn, New York
Dampney Co of America, 1243 River St, Hyde Park, Mass.
Electro-Chemical Supply & Engrg Co, Paoli, Pa.
Metallizing Engrg Co, 21-07 41st St, Long Island City, N. Y.
Thurmalox Co, 3109 N Broad St, Philadelphia, Pa.
Adv page 168

COILS, PIPE, TUBING

California Steel Products Co, San Francisco, Calif.

Clow, James B, & Sons, 201-299 N Talman Ave, Chicago, Ill.
Duriron Co, Inc, Dayton, Ohio.
Grinnell Co, 277 W Exchange St, Providence, R. I.
Adv page 119
Griscom-Russell Co, 285 Madison Ave, New York, N. Y.
Hamilton Copper & Brass Works, Hamilton, Ohio.
Harris, Arthur & Co, N Aberdeen St, Chicago, Ill.
Harrisburg Steel Corp, Harrisburg, Pa.
Howe Ice Machine Co, 2821 Montrose Ave, Chicago, Ill.
Keating, E F, Pipe Bending Co, Inc, Hartford, Conn.
Limbert, Geo B, & Co, 570 Fulton St, Chicago, Ill.
Midwest Piping & Supply Co, 1450 S 2nd St, St. Louis, Mo.
Adv page 137
National Pipe Bending Co, New Haven, Conn.
National Pipe & Mfg Co, Liberty Ave, Pittsburgh, Pa.
National Valve & Mfg Co, 3102 Liberty Ave, Pittsburgh, Pa.
Adv page 232
Parker Appliance Co, 17325 Euclid Ave, Cleveland, Ohio.
Pittsburgh Pipe Coil & Bending Co, Pittsburgh, Pa.
Pittsburgh Piping & Equipt Co, 12 43rd St, Pittsburgh, Pa.
Adv page 131
Power Piping Div, Blaw-Knox Co, 1525 Pennsylvania Ave, Blawnox, Pa.
Rempe Co, 340 N Sacramento Blvd, Chicago, Ill.
Rome-Turney Radiator Co, 200 Lynch St, Rome, N. Y.
Ross Heater & Mfg Co, Inc, 1409 West Ave, Buffalo, N. Y.
Shaw, B F, Co, 509 E 2nd St, Wilmington, Del.
Adv page 199
Sturtevant, B F, Co, 47 Readville St, Hyde Park, Boston, Mass.
Wolverine Tube Co, Detroit, Mich.
Zallea Bros & Johnson, 820 Locust St, Wilmington, Del.

COILS, REFRIGERATING

Baker Ice Machine Co, Inc, Omaha, Neb.
Fedders Mfg Co, 63 Tonawanda St, Buffalo, N. Y.
Adv page 187
Frick Co, Inc, 325 Broadway, Waynesboro, Pa.
Adv page 140
Harrisburg Steel Corp, Harrisburg, Pa.
Howe Ice Machine Co, 2821 Montrose Ave, Chicago, Ill.
Keating, E F, Pipe Bending Co, Inc, Hartford, Conn.
McQuay, Inc, Minneapolis, Minn.
National Pipe Bending Co, New Haven, Conn.
Parker Appliance Co, 17325 Euclid Ave, Cleveland, Ohio.
Phoenix Ice Machine Co, Cleveland, Ohio.
Pittsburgh Pipe Coil & Bending Co, Pittsburgh, Pa.
Rempe Co, 340 N Sacramento Blvd, Chicago, Ill.
Rome-Turney Radiator Co, 200 Lynch St, Rome, N. Y.
Stearns-Roger Mfg Co, Denver, Colo.
Sturtevant, B F, Co, 47 Readville St, Hyde Park, Boston, Mass.
Trane Co, 2012 Cameron Ave, La Crosse, Wis.
Typhoon Air Conditioning Co, 252 W 26th St, New York, N. Y.
Vesterdahl, Karl, & Co, 90 West St, New York, N. Y.
Vilter Mfg. Co, 2217 S 1st St, Milwaukee, Wis.
Vogt, Henry Machine Co, 1000 W Ormsby St, Louisville, Ky.
Adv page 217
Wolverine Tube Co, Detroit, Mich.
Worthington Pump & Machinery Corp, Harrison, N. J.
York Ice Machry Corp, York, Pa.

COLD-STORAGE PLANTS

Baker Ice Machine Co, Inc, Omaha, Neb.
Frick Co, Inc, 325 Broadway, Waynesboro, Pa.
Adv page 140
General Machinery Co, Spokane, Wash.
Vilter Mfg Co, 2217 S 1st St, Milwaukee, Wis.
Vogt, Henry, Machine Co, 1000 W Ormsby St, Louisville, Ky.
Adv page 217
Worthington Pump & Machinery Corp, Harrison, N. J.
York Ice Machry Corp, York, Pa.

COLLECTORS, DUST

Allen Billmyre Corp, Daily News Bldg, New York, N. Y.
American Air Filter Co, Louisville, Ky.
American Blower Corp, 6000 Russell St, Detroit, Mich.
American Foundry Equipment Co, Mishawaka, Ind.
Bartlett & Snow, C O, Co, Cleveland, Ohio
Adv page 151
Buffalo Forge Co, 488 Broadway, Buffalo, N. Y.
Adv page 160
Diamond Power Specialty Corp, Box 288, Detroit, Mich.
Adv pages 8-9
Dracco Corp, 4083 E 116th St, Cleveland, Ohio.
Engineering Specialties Co, 39 Cortlandt St, New York, N. Y.
Federal Pneumatic Systems, Inc, N Dearborn St, Chicago, Ill.
Garden City Fan Co, 332 S Michigan Ave, Chicago, Ill.
Holly Pneumatic Systems, Inc, Dept 15, 15 E 40th St, New York, N. Y.
Kirk & Blum Mfg Co, 2831 Spring Grove Ave, Cincinnati, Ohio.
Pangborn Corp, P O Box 38010, Hagerstown, Md.
Peabody Engrg Corp, 580 5th Ave, New York, N. Y.
Prat-Daniel Corp, 80 S Water St, Port Chester, N. Y.
Adv pages 169, 207
Skinner Heating & Ventilating Co, 1990 N 9th, St. Louis, Mo.
Sly, W W, Mfg Co, Cleveland, O.
Spencer Turbine Co, 488 New Park Ave, Hartford, Conn.
Staynew Filter Corp, Rochester, N. Y.
Adv page 241
Steacy-Schmidt Mfg Co, York, Pa.
Sterling Blower Co, 791 Windsor St, Hartford, Conn.
United Conveyor Corp, Dearborn & Van Buren Sts, Chicago, Ill.
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53
Young & Bertke Co, 1040 Hulbert Ave, Cincinnati, Ohio

COLLECTORS, FLYASH

American Blower Corp, 6000 Russell St, Detroit, Mich.
Bubar, Hudson H, 15 Park Row, New York, N. Y.
Buell Engrg Co, Inc, 70 Pine St, New York, N. Y.
Green Fuel Economizer Co, 637 Main St, Beacon, N. Y
Prat-Daniel Corp, 80 S Water St, Port Chester, N. Y.
Adv pages 169, 207
Research Corp, 405 Lexington Ave, New York, N. Y.
Sturtevant, B F, Co, 47 Readville St, Hyde Park, Boston, Mass.
Western Precipitation Corp, 1016 W 9th, Los Angeles, Cal.

COLUMNS, WATER

(See Water Columns)

COMBUSTION CONTROL

(See Control Systems, Combustion)

COMPOUNDS, CONCRETE, RESURFACING

Flexrock Co, 23rd & Manning Sts, Philadelphia, Pa.
Adv page 144
Truscon Laboratories, Detroit, Mich.

COMPOUNDS, GREASE-REMOVING

Barrett Co, 40 Rector St, New York, N. Y.
Detroit Rex Products Co, Hillview & Sorrento Aves, Detroit, Mich.
du Pont de Nemours, E I, & Co, Wilmington, Del.
Oakite Products Inc, 23 Thames St, New York, N. Y.
Quigley Co, 56 W 45th St, New York, N. Y.
Adv page 202

COMPOUNDS, PIPE-JOINT

Crane Co, 836 S Michigan Ave, Chicago, Ill.
Adv page 113
Crane Packing Co, 1801 Cuyler Ave, Chicago, Ill.
Dixon, Joseph, Crucible Co, 170 Wayne St, Jersey City, N. J.
Adv page 238
Garlock Packing Co, 400 Main St, Palmyra, N. Y.
Adv pages 125, 195
Grinnell Co, Inc, 277 W Exchange St, Providence, R. I.
Adv page 119
Key Co, Alta Sita, East St Louis, Ill.
Keystone Lubricating Co, Clearfield & Lippincott Sts, Philadelphia, Pa.
National Engineering Products, Inc, Commerce & Savings Bldg, Washington, D. C.
Quigley Co, 56 W 45th St, New York, N. Y.
Adv page 202
Rockwood Sprinkler Co, 54 Harlow St, Worcester, Mass.
Smooth-On Mfg Co, D-30, 572 Communipaw Ave, Jersey City, N. J.
U. S. Graphite Co, 1621 Holland Ave, Saginaw, Mich.
X-Pando Corp, 43–15 36th St, Long Island City, N. Y.

COMPOUNDS, RUST-PREVENTING

Adkins, Young & Allen Co, S Jefferson St, Chicago, Ill.
Barrett Co, 40 Rector St, New York, N. Y.
Chemical Solvent Co, Box 487, Birmingham, Ala.
Dampney Co of America, 1243 River St, Hyde Park, Mass.
Dixon, Joseph, Crucible Co, 170 Wayne St, Jersey City, N. J.
Adv page 238
Goodrich, B F, Co, 460 S Main St, Akron, Ohio
Haering, D W, & Co, 2308 S Winchester, Chicago, Ill.
Houghton, E F, & Co, 244–50 W Somerset St, Phila, Pa.
Inertol Co, Inc, 401 Broadway, New York, N. Y.
Keystone Lubricating Co, Clearfield & Lippincott Sts, Philadelphia, Pa.
Monsanto Chemical Co, St. Louis, Mo.
North American Fibre Products Co, Cleveland, Ohio
Adv page 142
Parker Rust-Proof Co, E Milwaukee Ave, Detroit, Mich.
Philadelphia Quartz Co, 121 S 3rd St, Philadelphia, Pa.
Rustvoid Products Inc, 30-30 Northern Blvd, Long Island City, N. Y.
Socony - Vacuum Oil Co, 26 Broadway, New York, N. Y.
Standard Oil Co, Ind., 910 S Michigan Ave, Chicago, Ill.
Standard Oil Co of N. J. 26 Broadway, New York, N. Y.
Wailes-Dove-Hermiston Corp, Westfield, N. J.
Whiting Leather & Belting Co, Long Island City, N. Y.

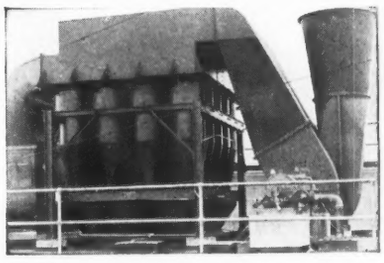
COMPOUNDS, SCALE-, RUST-REMOVING

McVicker, W B, Co, Douglass St, Brooklyn, N. Y.
Oakite Products, Inc, 23 Thames St, New York, N. Y.
Rustvoid Products Inc, 30-30 Northern Blvd, Long Island City, N. Y.

COMPOUNDS, SLUSHING

Houghton, E F, & Co, 244–50 W Somerset St, Philadelphia, Pa.
Ironsides Co, Columbus, Ohio.
Socony - Vacuum Oil Co, 26 Broadway, New York, N. Y.

THERMIX DUST COLLECTORS



Variable problems must be met by the proper type of apparatus. Therefore, there are three types of Thermix Dust Collectors.

THERMIX CONTROLLED MULTICYCLONES

For overall mechanical collection at its best. They permit only that dust to escape which is of such extreme microscopic fineness that it will travel great distances before reaching the earth.

The patented Multicyclone control is vital. Good collection at partial loads can be obtained only by its use, since otherwise the reduced centrifugal force at lower loads reduces collection efficiency.

THERMIX TUBULAR DUST COLLECTOR

This offers almost the same remarkable efficiency in the nuisance range, and only slightly less overall collection than the Multicyclone, of which it is one type. Space, cost and weight are at a minimum consistent with sturdy wear resisting apparatus.

THERMIX RECIRCULARS

The original skimmer type dust collector. Has no draft loss, excellent collection, and may also be used as the I.D. Fan. The space it occupies is little more than a normal I.D. Fan.

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88 So. Water St. **Port Chester, N. Y.**

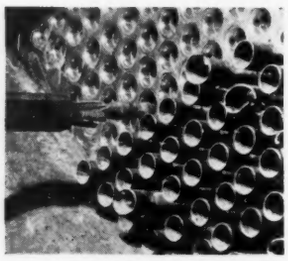
DELIVER AIR AT LOW COST
where you need it

You save money by installing SCHRAMM air compressors. These modern units—correctly engineered and designed for high efficiency and low power consumption—can be placed in any convenient location. Vertical cylinders, cast enbloc, insure a compact design using a minimum of floor space. Perfect balance eliminates the need for special foundations. Ability to install the unit close to the point where air is needed, reduces piping costs. Integral cooling saves water and insures uniform temperature for proper lubrication.

SCHRAMM INC., WEST CHESTER, PA.

SCHRAMM
COMPRESSORS

Save Time and Money on Condenser Repairs



Corroded tube ends stretched beyond the tube sheet; they will be cut off and the tubes rerolled into the tube sheet as good as new.

C & C METHOD
STRIPS CONDENSERS IN RECORD TIME SAVES OLD TUBES BY STRETCHING

Retubing condensers and heat exchangers need no longer be disagreeable, tedious and expensive. You can save the old tubes by stretching, cutting off the corroded ends and repacking or rerolling them into the tube sheet for many more years of service. C & C Machines can strip condensers of thousands of tubes in hours instead of days—saving as much as 80% in time and increase the scrap value of old tubes.

C & C Renovation Service has saved thousands of dollars and cut condenser outage time for power plants everywhere. Investigate its enormous time and money saving possibilities in your plant. Data on request.

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Swan-Finch Oil Corp, RCA Bldg West, New York, N. Y.
Warren Bros Roads Co, Cambridge, Mass.

COMPOUNDS, WATERPROOFING

Barrett Co, 40 Rector St, New York, N. Y.
du Pont de Nemours, E I, & Co, Wilmington, Del.
Halowax Co, 30 East 42nd St, New York, N. Y.
Johns-Manville, 22 E 40th St, New York, N. Y.
Adv pages 36-37
Koppers Co, Pittsburgh, Pa.
North American Fibre Products Co, Cleveland, Ohio
Adv page 142
Plouff Co, 1150 Columbus Ave, Boston, Mass.
Smooth-On Mfg Co, D-30, 572 Communipaw Ave, Jersey City, N. J.
Socony-Vacuum Oil Co, 26 Broadway, New York, N. Y.
Sonneborn, L, Sons, Inc, 88 Lexington Ave, New York, N. Y.
Toch Bros, Inc, 2600 Richmond Terrace, Staten Island, N. Y.
Tropical Paint & Oil Co, Cleveland, Ohio.
Truscon Labs, Detroit, Mich.
Wailes Dove-Hermiston Corp, Westfield, N. J.

COMPRESSOR VALVES

(See Valves, Pump & Compressor)

COMPRESSORS, AIR, GAS

Allen Billmyre Corp, Daily News Bldg, New York, N. Y.
Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
American-Marsh Pumps, Inc, 60 Capitol Ave, N E, Battle Creek, Mich.
Beach-Russ Co, 50 Church St, New York, N. Y.
Brunner Mfg Co, 1821 Broad St, Utica, N. Y.
Bury Compressor Co, Erie, Pa.
Chicago Pneumatic Tool Co, 6-8 E 44th St, New York, N. Y.
Cooper-Bessemer Corp, Mount Vernon, Ohio.
Crowell Mfg Co, 319 Franklin Ave, Brooklyn, N. Y.
Curtis Pneumatic Machinery Co, 1934 Kienlen Ave, St. Louis, Mo.
Adv page 132
De Laval Steam Turbine Co, Trenton, N. J.
Adv pages 50, 201
De Vilbiss Co, Toledo, Ohio
Elliott Co, Jeannette, Pa.
Adv pages 6-7
Fuller Co, 111 Bridge St, Catasauqua, Pa.
Adv page 130
Gardner-Denver Co, 100 Gardner Drive, Quincy, Ill.
Hardie-Tynes Mfg Co, Birmingham, Ala.
Hobart Bros Co, Troy, Ohio.
Ingersoll-Rand Co, 11 Broadway, New York, N. Y.
Adv pages 38-39
Kraissl Co, Hackensack, N. J.
Le Roi Co, Milwaukee, Wis.
Mesta Machine Co, P O Box 1466, Pittsburgh, Pa.
Nash Engrg Co, S Norwalk, Conn.
National Steam Pump Co, Upper Sandusky, Ohio.
National Transit Pump & Machine Co, Oil City, Pa.
Nordberg Mfg Co, 3703 S Chase Ave, Milwaukee, Wis.
O K Clutch & Machinery Co, Columbia, Pa.
Oliver United Filters, Inc, Oakland, Calif.
Pennsylvania Pump & Compressor Co, Easton, Pa.
Quincy Compressor Co, Quincy, Ill.
Roots-Connersville Blower Corp, Connersville, Ind.
Schramm, Inc, West Chester, Pa.
Adv page 170
Spencer Turbine Co, 488 New Park Ave, Hartford, Conn.
Sturtevant, B F, Co, 47 Readville St, Hyde Park, Mass.
Sullivan Machinery Co, Michigan City, Ind.
Westinghouse Air Brake Co Wilmerding, Pa.
Worthington Pump & Machinery Corp, Harrison, N. J.
Wright Mfg Div of American Chain & Cable Co, York, Pa.
Yeomans Bros Co, 1446 Dayton St, Chicago, Ill.
York Ice Machry Corp, York, Pa.

COMPRESSORS, REFRIGERATION

Baker Ice Machine Co, Inc, Omaha, Neb.
Brunner Mfg Co, 1821 Broad St, Utica, N. Y.
Carrier Corp, Syracuse, N. Y.
Frick Co, Inc, 325 Broadway, Waynesboro, Pa.
Adv page 140
General Machinery Co, Spokane, Wash.
Howe Ice Machine Co, 2821 Montrose Ave, Chicago, Ill.
Phoenix Ice Machine Co, Cleveland, Ohio.
Trane Co, 2012 Cameron Ave, La Crosse, Wis.
Vesterdahl, Karl, & Co, 90 West St, New York, N. Y.
Vilter Mfg Co, 2217 S 1st St, Milwaukee, Wis.
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53
Worthington Pump & Machinery Corp, Harrison, N. J.
York Ice Machinery Corp, York, Pa.

CONDENSER REPAIRS

C&C Corp, 379 4th Ave, New York, N. Y.
Adv page 170
Condenser Service & Engrg Co, 310 12th St, Hoboken, N. J.

CONDENSER TUBES

(See Tubes, Condenser)

CONDENSERS, EVAPORATIVE

Baker Ice Machine Co, Inc, Omaha, Neb.
Buffalo Forge Co, 488 Broadway, Buffalo, N. Y.
Adv page 160
Carrier Corp, Syracuse, N. Y.
Fairbanks, Morse & Co, 600 S Michigan Ave, Chicago, Ill.
Frick Co, 325 Broadway, Waynesboro, Pa.
Adv page 140
McQuay, Inc, Minneapolis, Minn.
Niagara Blower Co, Buffalo, N. Y.
Trane Co, 2012 Cameron Ave, La Crosse, Wis.
Worthington Pump & Machinery Co, Harrison, N. J.
York Ice Machinery Corp, York, Pa.
Young Radiator Co, Racine, Wis.

CONDENSERS, JET

Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
Chicago Pneumatic Tool Co, 6-8 E 44th St, New York, N. Y.
Croll-Reynolds Engrg Co, 17 John St, New York, N. Y.
Adv page 177
Dean Brothers Co, Indianapolis, Ind.
Elliott Co, Jeannette, Pa.
Adv pages 6-7
Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 24-25
Ingersoll-Rand Co, 11 Broadway, New York, N. Y.
Adv pages 38-39
Ross Heater & Mfg Co, 1407 West Ave, Buffalo, N. Y.

Look for the noun in the product listing, for example:
"Conduit, Electrical"
not
"Electrical Conduit"

Look for the noun in the product listing, for example:

"Condensers, Surface"
not
"Surface Condensers"

Schubert-Christy Corp, 1600 Georgia St, Affton Station, St. Louis, Mo.
Schutte & Koerting Co, 12th & Thompson Sts, Phila, Pa.
Wheeler, C H, Mfg Co, Lehigh & Sedgley Aves, Phila. Pa.

CONDENSERS, REFRIGERATION

(See also Refrigerating Systems)
Alberger Heater Co, 287 Chicago St, Buffalo, N. Y.
Alco Products Div, 36 Church St, New York, N. Y.
Andale Co, 1600 Arch St, Philadelphia, Pa.
Baker Ice Machine Co, Inc, Omaha, Neb.
Carrier Corp, Syracuse, N. Y.
Fedders Mfg Co, 63 Tonawanda St, Buffalo, N. Y.
Adv page 187
Frick Co, 325 Broadway, Waynesboro, Pa.
Adv page 140
Howe Ice Machine Co, 2821 Montrose Ave, Chicago, Ill.
Ingersoll-Rand Co, 11 Broadway, New York, N. Y.
Adv pages 38-39
Lummus Co, 420 Lexington Ave, New York, N. Y.
McCord Radiator & Mfg Co, Detroit, Mich.
Richmond Engrg Co, 7th & Hospital Sts, Richmond, Va.
Rome-Turney Radiator Co, 200 Lynch St, Rome, N. Y.
Trane Co, 2012 Cameron Ave, La Crosse, Wis.
Vesterdahl, Karl, & Co, 90 West St, New York, N. Y.
Vilter Mfg Co, 2217 S 1st St, Milwaukee, Wis.
Vogt, Henry, Machine Co, 1000 W Ormsby St, Louisville, Ky.
Adv page 217
Worthington Pump & Machinery Corp, Harrison, N. J.
York Ice Machry Corp, York, Pa.

CONDENSERS, SURFACE

Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
Braun, C F, & Co, 1000 S Fremont Ave, Alhambra, Calif.
Condenser Service & Engrg Co, 310 12th St, Hoboken, N. J.
Croll-Reynolds Engrg Co, 17 John St, New York, N. Y.
Adv page 177
Elliott Co, Jeannette, Pa.
Adv pages 6-7
Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 24-25
Ingersoll-Rand Co, 11 Broadway, New York, N. Y.
Adv pages 38-39
Ross Heater & Mfg Co, Inc, 1409 West Ave, Buffalo, N. Y.
Schubert-Christy Corp, 1600 Georgia St, St. Louis, Mo.
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53
Wheeler, C H, Mfg Co, Lehigh & Sedgley Aves, Phila, Pa.
Worthington Pump & Machinery Corp, Harrison, N. J.

CONDUIT-BENDING MACHINES

(See Pipe-Bending Machines)

CONDUIT, ELECTRICAL

Continental-Diamond Fibre Co, Dept 18, Newark, Del.
General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 198, 207, 210, 215
Johns-Manville, 22 E 40th St, New York, N. Y.
Adv pages 36-37
National Electric Products Corp, Pittsburgh, Pa.
Steel & Tubes Div, Republic Steel Corp, 218 E 131st St, Cleveland, Ohio.
Adv page 149
Youngstown Sheet & Tube Co, Youngstown, Ohio.
Adv page 153

CONDUIT, METAL, FLEXIBLE

(See Tubing, Metal, Flexible)

CONDUIT, STEAM

(See Underground Steam Conduit)

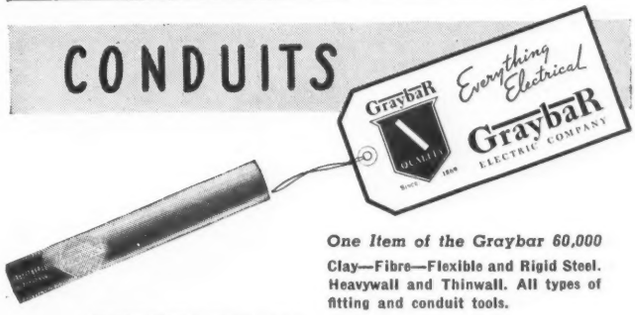
CONDUIT, WOOD

American District Steam Co, 70 Bryant St, N Tonawanda, N. Y.
Adv page 242
Wyckoff Pipe & Creosoting Co, 522 Fifth Ave, New York, N. Y.

CONTROL SYSTEMS, COMBUSTION

Askania Regulator Co, S Michigan Ave, Chicago, Ill.
Bailey Meter Co, 1036 Ivanhoe Rd, Cleveland, Ohio.
Adv page 173
Brooke Engineering Co, 517 Wayne Ave, Philadelphia, Pa.

CONDUITS



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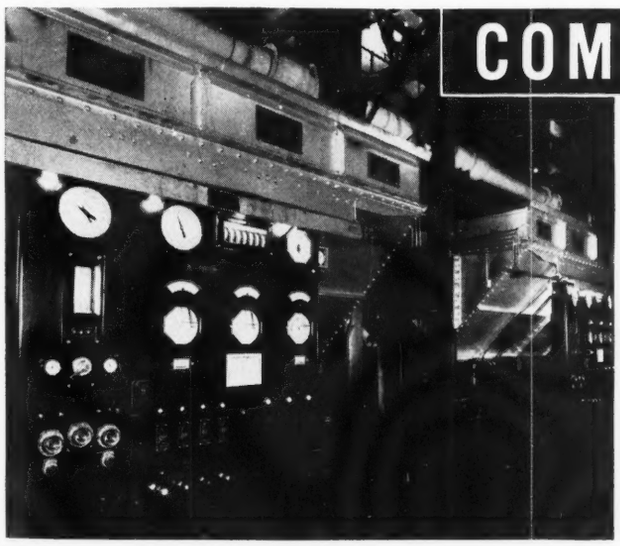

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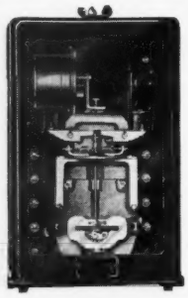

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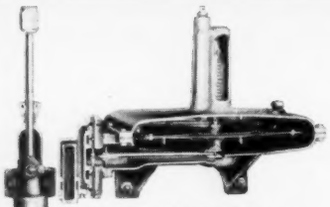

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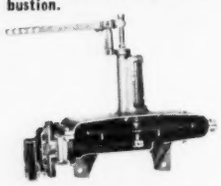
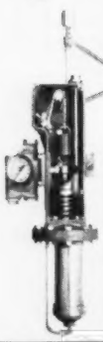


Fuel Feed Controller automatically working from boiler pressure will adjust the rate of combustion by regulating fuel supply.



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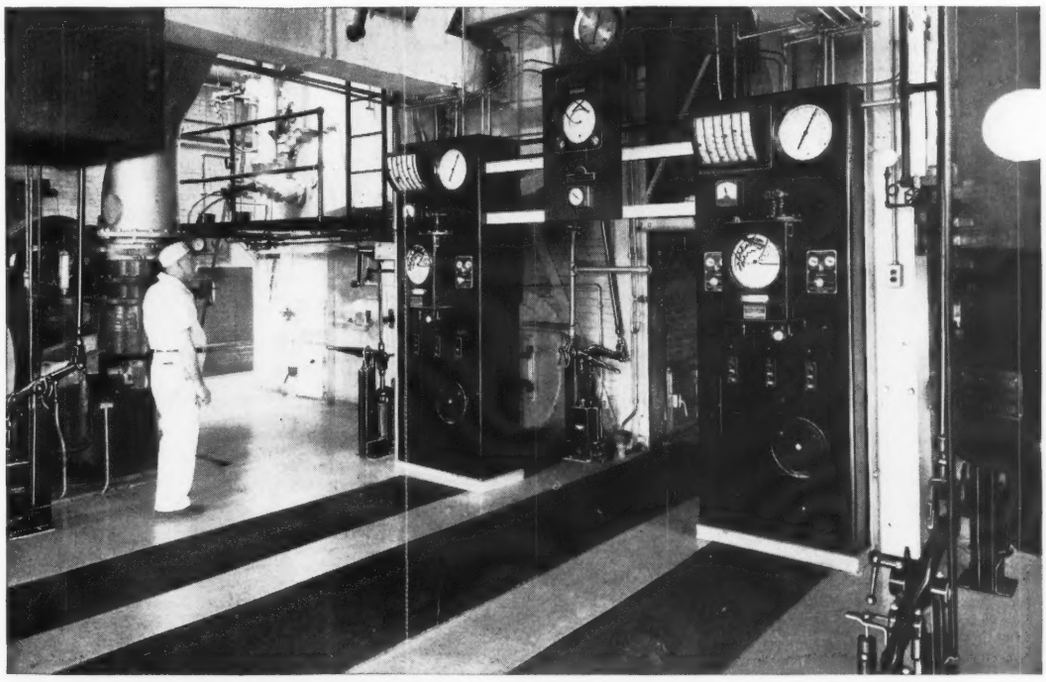

Mr. John Dobson, Chief Engineer, watches Bailey Meter Control carry the Sucrest Refinery load at Test Efficiencies

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Lakeside Bridge & Steel Co, Milwaukee, Wis.
Lane Mfg Co, Montpelier, Vt.
Link-Belt Speeder Corp, 301 W Pershing Rd, Chicago, Ill.
Northern Engrg Works, Detroit, Mich.
Reading Chain & Block Corp, 2100 Adams St, Reading, Pa.
Roeper Crane & Hoist Works, 1729 N 10th St, Reading, Pa.
Shaw-Box Crane & Hoist Div, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp, 453 Schuyler Ave, Montour Falls, N. Y.
Whiting Corp, 15657 Lathrop Ave, Harvey, Ill.

CRANES, HAND-POWER

Bradney Machine Co, Inc, Middletown, N. Y.
Chisholm-Moore Hoist Corp, 6015 Fremont, Tonawanda, N. Y.
Cleveland Crane & Engrg Co, Wickliffe, Ohio.
Detroit Hoist & Machine Co, Detroit, Mich.
Euclid Crane & Hoist Co, Euclid Ohio.
Harrington Co, 17th & Callowhill Sts, Philadelphia, Pa.
Industrial Brownhoist Corp, Bay City, Mich.
Louden Machinery Co, Fairfield, Iowa.
Northern Engrg Works, Detroit.
Palmer-Bee Co, Detroit, Mich.
Reading Chain & Block Corp, 2100 Adams St, Reading, Pa.
Roeper Crane & Hoist Works, 1729 N 10th St, Reading, Pa.
Shaw-Box Crane & Hoist Div, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp, 453 Schuyler Ave, Montour Falls, N. Y.
Whiting Corp, 15657 Lathrop Ave, Harvey, Ill.
Wright Mfg Div of American Chain & Cable Co, York, Pa.

CRUSHERS, COAL

American Pulverizer Co, 1029 Macklind Ave, St. Louis, Mo.
Adv page 229
Bartlett & Snow, C O, Co, Cleveland, Ohio.
Adv page 151
Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 24-25
Jeffrey Mfg Co, 932-99 N 4th St, Columbus, Ohio.
Kennedy-Van Saun Mfg & Engrg Corp, 2 Park Ave, New York, N. Y.
Koppers Co, Pittsburgh, Pa.
Penn Crusher Co, Phila, Pa.
Robins Conveying Belt Co, Passaic, N. J.
Stearns-Roger Mfg Co, Denver, Colo.
Stephens-Adamson Mfg Co, 5 Ridgeway Ave, Aurora, Ill.
Sturtevant Mill Co, Harrison Sq, Dorchester, Boston, Mass.
Vulcan Iron Works, 750 S Main St, Wilkes-Barre, Pa.
Webster Mfg Inc, Tiffin, Ohio.

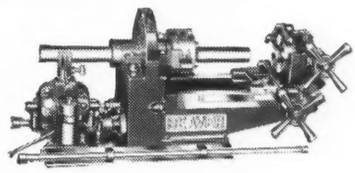
CUPS, GREASE

Alemite Div, Stewart-Warner Corp, Chicago, Ill.
American Injector Co, Detroit, Mich.
Bowen Products Corp, Auburn, N. Y.
Crane Co, 836 S Michigan Ave, Chicago, Ill.
Adv page 113
Hunter Pressed Steel Co, 8000 Maple Ave, Lansdale, Pa.
Jarecki Mfg Co, Erie, Pa.
Adv page 242
Keystone Lubricating Co, 21st Clearfield & Lippincott Sts, Phila, Pa.
Link-Belt Co, 519 N Holmes Ave, Indianapolis, Ind.
Adv page 3
Lonergan, J E, Co, Race St, Philadelphia, Pa.
Lunkenheimer Co, Box 360, Annex Station, Cincinnati, Ohio.
Adv pages 14-15
Nathan Mfg Co, 250 Park Ave, New York, N. Y.
Penberthy Injector Co, 1242 Holden Ave, Detroit, Mich.
Powell, Wm, Co, Cincinnati, O.
Adv pages 252-253
Williams, D T, Valve Co, Spring Grove Ave, Cincinnati, O.

CUTTING & THREADING TOOLS, PIPE

Beaver Pipe Tools, Inc, 310 Power Ave, Warren, Ohio
Adv page 175

IMMEDIATE DELIVERY!

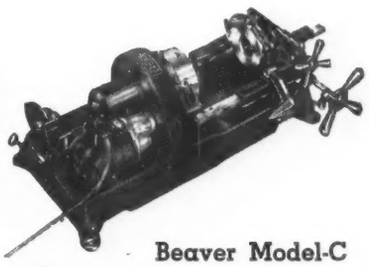


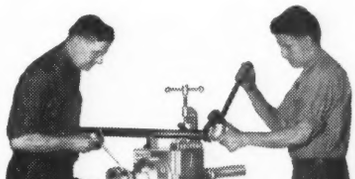
Beaver Model-A

A high-speed heavy-duty deluxe Pipe and Bolt Machine. Range ⅛ to 2-inch up to 12-inch with geared tools and drive shaft. Bolts ¼ to 2-inch. From $309.50 up. Wt. 415 lbs. Ask for Bulletin-A.

Beaver Model-B

A small utility Pipe and Bolt Machine combining many features of Model-A with the easy portability of Model-C. Range ⅛ to 2-inch up to 8-inch with drive shaft and geared tools. Bolts up to 1½-inch. Weight 280 lbs. From $217.50 up. Ask for Bulletin-B.



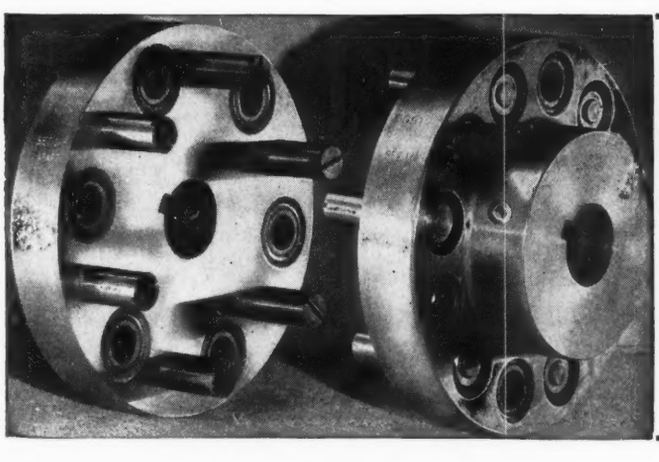


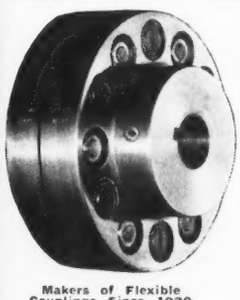
Beaver Model-C

A sturdy little Power Unit

Converts Hand Pipe Tools into Power Tools from ¼ to 8-inches. Threads 8-inch in 6 minutes. Threads bolts up to 1½-inch. Equipped with automatic chuck wrench ejector—a safety feature. Two men can use it at the same time without interference. Easily portable — weighs about 150 lbs. From $125.00 up. Write for Bulletin-C.

BEAVER PIPE TOOLS
Highest Quality • WARREN, OHIO • *For 40 Years*
1240 POWER AVENUE





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AJAX FLEXIBLE COUPLING CO.
132 English Street, Westfield, New York

Bignall & Keeler Mach Works, 512 Leclaire Ave, Edwardsville, Ill.
Cox & Sons Co, South Bridgeton, N. J.
Curtis & Curtis Co, 302 Garden St, Bridgeport, Conn.
Jarecki Mfg Co, Erie, Pa.
Adv page 242
Landis Machine Co, Waynesboro, Pa.
Oster Mfg Co, Cleveland, Ohio
Ridge Tool Co, Elyria, Ohio
Toledo Pipe Threading Machine Co, 1441 Summit St, Toledo, Ohio

CUTTING TOOLS, BOILER-TUBE

Faessler, J, Mfg Co, Moberly, Mo.
Landis Machine Co, Waynesboro, Pa.
Wiedeke, Gustav, Co, 1833 Richard St, Dayton, Ohio.

DEAERATORS

(See Heaters)

DEALERS, EQUIPMENT

(See Searchlight Section of this issue, page 245, and Classified Directory, page 247 of December POWER)

DESUPERHEATERS

Andale Co, 1600 Arch St, Philadelphia, Pa.
Babcock & Wilcox Co, 85 Liberty St, New York, N. Y.
Adv pages 4-5
Combustion Engrg Co, Inc, 206 Madison Ave, New York, N. Y.
Adv pages 42-43
Elliott Co, Jeannette, Pa.
Adv pages 6-7
Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 25-25
General Regulator Corp, 165 Broadway, New York, N. Y.
Mercon Regulator Co, 2357 N 29th St, Milwaukee, Wis.
Northern Equipment Co, 1221 Grove Drive, Erie, Pa.
Adv page 111
Republic Flow Meters Co, 2222 Diversey Pkwy, Chicago, Ill.
Adv pages 171, 176, 192, 221
Schutte & Koerting Co, 12th & Thompson Sts, Philadelphia, Pa.
Spence Engrg Co, Inc, 61 Grant St, Walden, N. Y.
Adv page 204
Swartwout Co, 18501 Euclid Ave, Cleveland, Ohio
Adv pages 20-21

DETECTORS, REFRIGERANT-GAS

Imperial Brass Mfg Co, 564 S Racine Ave, Chicago, Ill.
Linde Air Products Co, 30 E 42nd St, New York, N. Y.
Adv pages 22-23
Turner Brass Co, Sycamore, Ill.

DIAPHRAGM VALVES

(See Valves, Diaphragm)

DC GENERATORS

(See Generators, Electric)

DC MOTORS

(See Motors, Electric)

DIESEL ENGINES

(See Engines, Oil)

DRESSERS, COMMUTATOR

Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
Grobet File Corp of America, 3 Park Place, New York, N. Y.
Ideal Commutator Dresser Co, 1025 Park Ave, Sycamore, Ill.
Mall Tool Co, 7740 S Chicago Ave, Chicago, Ill.
Martindale Electric Co, 1385 Hird Ave, Cleveland, Ohio

DRESSING, BELT

Baldwin Belting & Leather Co, 85 Chambers St, New York, N. Y.
Cling-Surface Co, Buffalo, N. Y.
Dixon, Joseph, Crucible Co, 170 Wayne St, Jersey City, N. J.
Adv page 238
Goodrich, B F, Co, 460 S Main St, Akron, Ohio
Houghton, E F, & Co, 244-50 W Somerset St, Phila, Pa.
Pennwell Oil & Belting Co, 5 White St, New York, N. Y.
Philadelphia Belting Co, 6th & Spring Garden Sts, Phila, Pa.
Raniville, F, Co, Grand Rapids, Mich.
Rhoads, J E, & Sons, 35 N Sixth St, Philadelphia, Pa.
Schieren, Chas A, Co, 30-39 Ferry St, New York, N. Y.
Schwartz Belting Co, 74 Murray St, New York, N. Y.

DRIERS, COAL

American Process Co, Sea Girt, N. J.
Babcock & Wilcox Co, 85 Liberty St, New York, N. Y.
Adv pages 4-5
Bartlett & Snow, C O, Co, Cleveland, Ohio
Adv page 151
Bos-Hatten, Inc, Buffalo, N. Y.
Hardinge Co, Inc, 240 Arch St, York, Pa.
Kennedy-Van Saun Mfg & Engrg Corp, 2 Park Ave, New York, N. Y.
Koppers Co, Pittsburgh, Pa.
Link-Belt Co, 300 W Pershing Rd, Chicago, Ill.
Adv page 3

DRILLS, PNEUMATIC, ELECTRIC, PORTABLE

Black & Decker Mfg Co, Towson, Md.
Buckeye Portable Tool Co, Dayton, Ohio
Chicago Pneumatic Tool Co, 6-8 E 44th St, New York, N. Y.
Clark Electric Co, Louisville, Ky.
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
Independent Pneumatic Tool Co, 600 W Jackson, Chicago, Ill.
Keeler, Wm H, Inc, Grand Haven, Mich.
Mall Tool Co, 7740 S Chicago Ave, Chicago, Ill.
Millers Falls Co, 59 Wells St, Greenfield, Mass.
Skilsaw Inc, Elston Ave, Chicago, Ill.
Snap-On Tools Corp, Kenosha, Wis.
Standard Electrical Tool Co, 1918 W 8th, Cincinnati, Ohio
Syntron Co, 492 Lexington Ave, Homer City, Pa.

DUST COLLECTORS

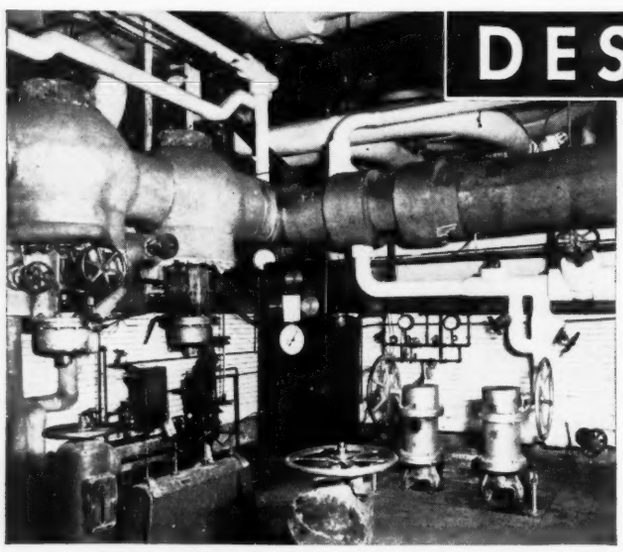
(See Collectors, Dust)

ECONOMIZERS

Babcock & Wilcox Co, 85 Liberty St, New York, N. Y.
Adv pages 4-5
Combustion Engrg Co, Inc, 206 Madison Ave, New York, N. Y.
Adv pages 42-43
Edge Moor Iron Works, 30 Rockefeller Plaza, New York.
Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 24-25
Green Fuel Economizer Co, 627 Main St, Beacon, N. Y.
Heilman Boiler Works, Allentown, Pa.
Keeler, E, Co, Williamsport, Pa.
Adv page 117
Richmond Engrg Co, 7th & Hospital Sts, Richmond, Va.
Riley Stoker Corp, 999 Neponset St, Worcester, Mass.
Adv pages 88-89
Springfield Boiler Co, Springfield, Ill.
Sturtevant, B F, Co, 47 Readville St, Hyde Park, Mass.
Wickes Boiler Co, 502 N Water St, Saginaw, Mich.

EJECTORS

American Injector Co, Detroit, Mich.
Condenser Service & Engrg Co, 310 12th St, Hoboken, N. J.



DESUPERHEATERS

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RATIO TYPE

This desuperheater is a self-supported venturi in which the desuperheating water, completely evaporated at all flows, is controlled by the steam flow in the correct proportion to reduce the steam temperature to the required value.

RATIO TANK TYPE

This unit is similar to the ratio type except that a water tank is added to give emergency water reserve.

STEAM ATOMIZING TYPE

In this desuperheater, built for extremely wide range operation and zero pressure loss, the desuperheating water is completely atomized at all rates of flow by a small quantity of high-pressure steam.

MECHANICAL TYPE

This unit is designed for special applications such as the control of turbine exhaust temperature or for use where atomizing steam is not available.

A Republic-Smoot engineer will gladly consult with you on your specific desuperheating problem. Write today, without obligation, for further details.

TYPICAL INSTALLATIONS

APPALACHIAN ELECTRIC POWER CO.
BOSTON EDISON CO.
BROOKLYN EDISON CO.
CINCINNATI GAS AND ELECTRIC CO.
E. I. DU PONT DE NEMOURS & CO.
NORTHERN PAPER MILLS
POTOMAC EDISON CO.
JACOB RUPPERT BREWERY
STANDARD OIL CO. OF N. J.
UNION BAG & PAPER CO.
THE TEXAS CO.
UNITED ILLUMINATING CO.

REPUBLIC FLOW METERS CO. 2222 DIVERSEY PKWY. CHICAGO, ILLINOIS

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It is a reference book for all of 1941. You will have occasion to use it again and again.

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Croll-Reynolds Engrg Corp, 17 John St, New York, N. Y.
Adv page 177
Duriron Co, Inc, Dayton, Ohio
Elliott Co, Jeannette, Pa.
Adv pages 6-7
Fischer & Porter Co, 59 W Queen Lane, Germantown, Phila, Pa.
Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 24-25
Hancock Valve Div, Manning, Maxwell & Moore, 143 Elias St, Bridgeport, Conn.
Ingersoll-Rand Co, 11 Broadway, New York, N. Y.
Adv pages 38-39
Jarecki Mfg Co, Erie, Pa.
Adv page 242
Lummus Co, 420 Lexington Ave, New York, N. Y.
Nathan Mfg Co, 250 Park Ave, New York, N. Y.
Penberthy Injector Co, 1242 Holden Ave, Detroit, Mich.
Quimby Pump Co, Inc, 347 Thomas St, Newark, N. J
Ross Heater & Mfg Co, Inc, 1409 West Ave, Buffalo, N. Y.
Schutte & Koerting Co, 12th & Thompson Sts, Phila, Pa.
Sellers, Wm, & Co, 1600 Hamilton St, Philadelphia, Pa.
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53
Wheeler, C H, Mfg Co, Lehigh & Sedgley Aves, Phila, Pa.

ELECTRICALLY OPERATED VALVES

(See Valves, Electrically Operated)

ELECTRODES, ARC OR GAS WELDING

(See Rods, Welding)

ELEVATORS, PASSENGER, FREIGHT

American Elevator & Machine Co, Inc, Louisville, Ky.
Atlantic Elevator Co, Erie Ave & D St, Philadelphia, Pa.
Bay State Elevator Co, Springfield, Mass.
Chelsea Elevator Co, 551 W 52nd St, New York, N. Y.
Energy Elevator Co, 219 New St, Philadelphia, Pa.
General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Gurney Elevator Co, Inc, 109 W 64th St, New York, N. Y.
Haughton Elevator Co, Toledo, Ohio
Kieckhefer, A, Elevator Co, Milwaukee, Wis.
Otis Elevator Co, 260 11th Ave, New York, N. Y.
Rosenberg, F, Elevator Co, Milwaukee, Wis.
Schatzman Elevator Corp, Reading, Pa.
Warner Elevator Mfg Co, 2603 Spring Grove Ave, Cincinnati, O.
Warsaw Elevator Mfg Co, Inc, Danville, Va.
Westinghouse Elect Elevator Co, 150 Broadway, New York, N. Y.

ENGINES, DIESEL

(See Engines, Oil)

ENGINES, GAS

Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
Atlas Imperial Diesel Engine Co, 1000 19th Ave, Oakland, Cal.
Bruce-Macbeth Engine Co, 2111 Center St, N W, Cleveland, Ohio
Caterpillar Tractor Co, 1940 Walker Ave, Peoria, Ill.
Chicago Pneumatic Tool Co, 6–8 E 44th St, New York, N. Y.
Clark Bros Co, Olean, N. Y.
Climax Engrg Co, Clinton, Iowa
Cooper-Bessemer Corp, Mt Vernon, Ohio
Dissinger, C H A, & Bros, Co, Inc, Wrightsville, Pa.
Enterprise Engine & Foundry Co, 2902 19th St, San Francisco, Calif.
Fairbanks, Morse & Co, 600 S Michigan Ave, Chicago, Ill.
Ingersoll-Rand Co, 11 Broadway, New York, N. Y.
Adv pages 38-39
Le Roi Co, Milwaukee, Wis.
National Transit Pump & Machine Co, Oil City, Pa.
Novo Engine Co, 1 Porter St, Lansing, Mich.
Rathbun-Jones Engrg Co, Toledo, Ohio
Reid, Joseph, Gas Engine Co, Box 177, Oil City, Pa.
Sterling Engine Co, 1252 Niagara St, Buffalo, N. Y.
Superior Engine Div, National Supply Co, Springfield, Ohio
Titusville Iron Works Co, Titusville, Pa.
Waukesha Motor Co, Waukesha, Wis.
Weber Engine Co, 12th & Winchester Sts, Kansas City, Mo.
Western Engine Co, 2740 E 37th St, Los Angeles, Calif.
Witte Engine Works, 1600 Oakland Bldg, Kansas City, Mo.
Worthington Pump and Machinery Corp, Harrison, N. J.

ENGINES, GASOLINE

Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
Buda Co, Harvey, Ill.
Buffalo Gasoline Motor Co, Buffalo, N. Y.
Caterpillar Tractor Co, 1940 Walker Ave, Peoria, Ill.
Climax Engrg Co, Clinton, Iowa
Dissinger, C H A, & Bros, Co, Inc, Wrightsville, Pa.
Hercules Motor Corp, Canton, O.
International Harvester Co, 180 N Michigan Ave, Chicago, Ill.
Le Roi Co, Milwaukee, Wis.
Lycoming Mfg Co, Williamsport, Pa.
Novo Engine Co, 1 Porter St, Lansing, Mich.
Sterling Engine Co, 1252 Niagara St, Buffalo, N. Y.
Stover Mfg & Engine Co, Ellis St, Freeport, Ill.
Waukesha Motor Co, Waukesha, Ill.
Witte Engine Works, 1600 Oakland Bldg, Kansas City, Mo.

ENGINES, OIL

Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
American Locomotive Co, 36 Church St, New York, N. Y.
Adv page 230
Anderson Diesel Engine Co, 6245 State Rd, Tacony, Pa.
Atlas Imperial Diesel Engine Co, 1000 19th Ave, Oakland, Cal.
Baldwin De La Vergne Sales Corp, Paschall P O, Philadelphia, Pa.
Ball-Muncie Engine Co, Muncie, Ind.
Bauer, Frank, & Co, 51 N Dean St, Englewood, N. J.
Bolinders Co, Inc, 33 Rector St, New York, N. Y.
Buckeye Machine Co, Lima, Ohio
Buda Co, Harvey, Ill.
Busch-Sulzer Bros Diesel Engine Co, 2nd & Utah, St Louis, Mo.
Adv page 154
Caterpillar Tractor Co, 1940 Walker Ave, Peoria, Ill.
Chicago Pneumatic Tool Co, 6–8 E 44th St, New York, N. Y.
Clark Bros Co, Olean, N. Y.
Continental Gin Co, 4600 Fourth Ave, South, Birmingham, Ala.
Cooper-Bessemer Corp, Mt Vernon, Ohio
Cummins Engine Co, Columbus, Ind.
Electric Boat Co, Groton, Conn.
Enterprise Engine & Foundry Co, 2902 19th St, San Francisco, Calif.
Fairbanks, Morse & Co, 600 S Michigan Ave, Chicago, Ill.
Fulton Iron Works, 6400 Gambleton Pl, St Louis, Mo.
General Motors Sales Corp, Cleveland, Ohio
Hercules Motors Corp, Canton.
Hill Diesel Engine Co, Lansing, Mich.
Hooven, Owens, Rentschler Div, Genl Mach Corp, Hamilton, O.
Ingersoll-Rand Co, 11 Broadway, New York, N. Y.
Adv pages 38-39
International Harvester Co, 180 N Michigan Ave, Chicago, Ill.
Johnson Mfg Co, Fox & Holly Sts, Seattle, Wash.
Kahlenberg Bros Co, Two Rivers, Wis.
Markey Machinery Co, Inc, 85 Horton St, Seattle, Wash.
Murphy Diesel Co, 5317 W Burnham St, Milwaukee, Wis.
Nordberg Mfg Co, 3073 S Chase Ave, Milwaukee, Wis.
Peet & Powers, Inc, 70 E 45th St, New York, N. Y.
Power Mfg Co, Marion, Ohio
Rathbun-Jones Engrg Co, Toledo, Ohio
Reid, Joseph, Gas Engine Co, Box 177, Oil City, Pa.
Standard Diesel Engine Co, 150 Whiton St, Jersey City, N. J.
Sterling Engine Co, 1252 Niagara St, Buffalo, N. Y.
Stover Mfg & Engine Co, Ellis St, Freeport, Ill.
Superior Engine Div, National Supply Co, Springfield, Ohio
Titusville Iron Works Co, Titusville, Pa.
Union Diesel Engine Co, 2200 E 7th St, Oakland, Calif.
Venn-Severin Machine Co, 1317 W North Ave, Chicago, Ill.
Washington Iron Works, 6th Ave South, Seattle, Wash.
Waukesha Motor Co, Waukesha, Wis.
Weber Engine Co, 12th & Winchester Sts, Kansas City, Mo.
Western Engine Co, 2740 E 37th St, Los Angeles, Calif.
Witte Engine Works, 1600 Oakland Bldg, Kansas City, Mo.
Wolverine Motor Works, Inc, Bridgeport, Conn.
Worthington Pump & Machinery Corp, Harrison, N. J.

ENGINES, STEAM

Ames Iron Works, Oswego, N. Y.
Dake Engine Co, 633 Monroe St, Grand Haven, Mich.
Elliott Co, Ridgeway, Pa.
Adv pages 6-7
Erie City Iron Works, 1422 East Ave, Erie, Pa.
Filer & Stowell Co, 147 E Becher St, Milwaukee, Wis.
Fitchburg Engrg Corp, Fitchburg, Mass.
Hardie-Tynes Mfg Co, Birmingham, Ala.
Harrisburg Foundry & Machine Co, Harrisburg, Pa.
Johnson Mfg Co, Fox & Holly Sts, Seattle, Wash.
Keeler, Godfrey, Co, Inc, 77 Warren St, New York, N. Y.
Morris Machine Works, 100 E Genessee St, Baldwinsville, N. Y.
Murray Iron Works Co, Burlington, Iowa
Adv page 46
Nagle Engine & Boiler Works, Erie, Pa.
Nordberg Mfg Co, 3073 S Chase Ave, Milwaukee, Wis.
Providence Engrg Works, Providence, R. I.
Skinner Engine Co, Dept U, Erie, Pa.
Troy Engine & Machine Co, 142 Railroad Ave, Troy, Pa.
Adv page 179

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Wachs, E H, Co, Dayton St, Chicago, Ill.
Wilson Snyder Mfg Corp, Pittsburg, Pa.

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Alco Products Div, 36 Church St, New York, N. Y.
Babcock & Wilcox Co, 85 Liberty St, New York, N. Y.
Adv page 4-5
Blaw-Knox Co, Pittsburgh, Pa.
Croll-Reynolds Engrg Co, 17 John St, New York, N. Y.
Adv page 177
Davis Engrg Corp, 1064-16 E Grand Ave, Elizabeth, N. J.
Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 24-25
Griscom-Russell Co, 285 Madison Ave, New York, N. Y.
International Filter Co, 325 W 25th Place, Chicago, Ill.
Manistee Iron Works, Manistee, Mich.
Ross Heater & Mfg Co, Inc, 1409 West Ave, Buffalo, N. Y.
Schutte & Koerting Co, 12th & Thompson Sts, Phila, Pa.
Squier, Geo L, Mfg Co, Buffalo, N. Y.
Stearns-Roger Mfg Co, Denver, Colo.
Stokes, F J, Machine Co, Olney P O, Philadelphia, Pa.
Struthers-Wells Titusville Corp, Titusville, Pa.
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U S Pipe & Foundry Co, Burlington, N. J.
Westinghouse Electric & Mfg Co, East Pittsburgh, Pa.
Adv pages 52-53
Zallea Bros & Johnson, 820 Locust St, Wilmington, Del.
Zaremba Co, Buffalo, N. Y.

EXPANDERS, BOILER-TUBE

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Helwig Mfg Co, St Paul, Minn.
Key Co, Alta Sita, East St Louis, Ill.
Wiedeke, Gustav, Co, 1833 Richard St, Dayton, Ohio

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(See Joints, Expansion)

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Cardox Corp, 307 N Michigan Ave, Chicago, Ill.
C-O-Two Fire Equipment Co, 10 Empire St, Newark, N. J.
Elkhart Brass Mfg Co, Elkhart, Ind.
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
Grinnell Co, 277 W Exchange St, Providence, R. I.
Adv. page 119
Kidde, Walter & Co, 6 West St, Bloomfield, N. J.
Pyrene Mfg Co, 560 Belmont Ave, Newark, N. J.
Rockwood Sprinkler Co, 54 Harlow St, Worcester, Mass.
Sellers, Wm. & Co, 1600 Hamilton St, Philadelphia, Pa.

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(See Also Blowers)
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Airtherm Mfg Co, 700 S Spring St, St. Louis, Mo.
Allen, E H, Co, Dept P, 22 Dorrance St, Boston, Mass.
American Blower Corp, 6000 Russell St, Detroit, Mich.
American Coal Burner Co, E Superior St, Chicago, Ill.
Adv page 47
Barnard & Leas Mfg Co, Moline, Ill.
Bayley Blower Co, 1817 S 66th St, Milwaukee, Wis.
Buffalo Forge Co, 488 Broadway, Buffalo, N. Y.
Adv page 160
Carling Turbine Blower Co, 25 St John's Rd, Worcester, Mass.
Champion Blower & Forge Co, Lancaster, Pa.
Clarage Fan Co, 621 Porter St, Kalamazoo, Mich.
Adv page 147
Coppus Engrg Corp, 350 Park Ave, Worcester, Mass.
De Bothezat Ventilating Equipment Div, East Moline, Ill.
De Laval Steam Turbine Co, Trenton, N. J.
Adv pages 50, 201
Diehl Mfg Co, Elizabethport, N. J.
Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 24-25
Garden City Fan Co, 332 S Michigan Ave, Chicago, Ill.
General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Grand Rapids Blow Pipe & Dust Arrester Co, Grand Rapids, Mich.
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
Green Fuel Economizer Co, 627 Main St, Beacon, N. Y.
Hartzell Propeller Fan Co, Piqua, Ohio.
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Lehigh Fan & Blower Co, Allentown, Pa.
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Adv page 30
Prat-Daniel Corp, 80 S Water St, Port Chester, N. Y.
Adv pages 169, 207
Robbins & Myers, Inc, Springfield, Ohio.
Skinner Heating & Ventilating Co, 1990 N 9th, St Louis, Mo.
Sly, W W, Mfg Co, Cleveland, O.
Sterling Blower Co, 791 Windsor St, Hartford, Conn.
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Wagner Electric Corp. St Louis, Mo.
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Adv page 164

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(See Conveyors, Feeder)

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Bartlett & Snow, C O, Co, Cleveland, Ohio.
Adv page 161
Black, Sivalls & Bryson, Inc, Oklahoma City, Okla.
Cochrane Corp, 3106 N 17th St, Philadelphia, Pa.
Adv pages 186, 192, 206, 214
Condenser Service & Engrg Co, 310 12th St, Hoboken, N. J.
Elgin Softener Corp, 55 North St, Elgin, Ill.
Haering, D W, & Co, 2308 S Winchester, Chicago, Ill.
Hungerford & Terry, Inc, Clayton, N. J.
International Filter Co, 325 W 25th Place, Chicago, Ill.
Leopold, F B, Co, Pittsburgh, Pa.
Manzel Bros Co, 326 Babcock St, Buffalo, N. Y.
National Aluminate Corp, 6222 W 66th Place, Chicago, Ill.
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Permutit Co, Dept A, 330 W 42nd St, New York, N. Y.
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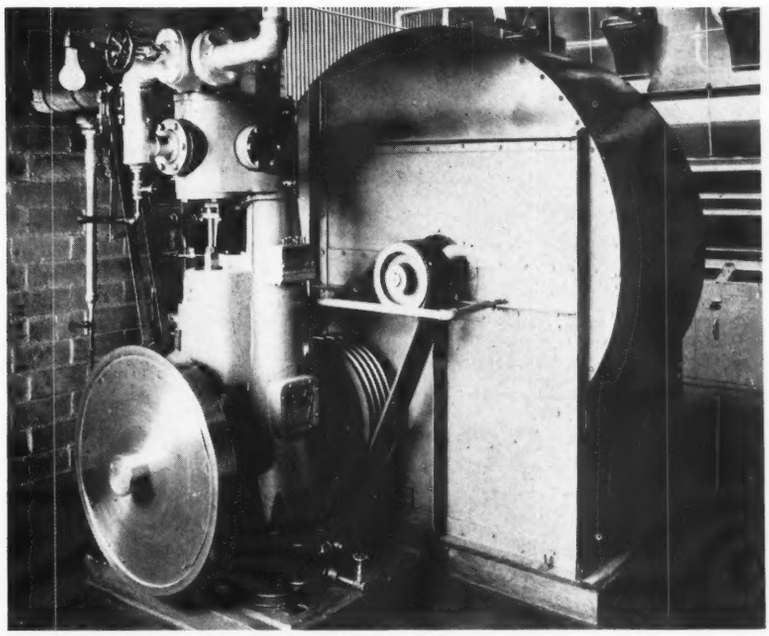

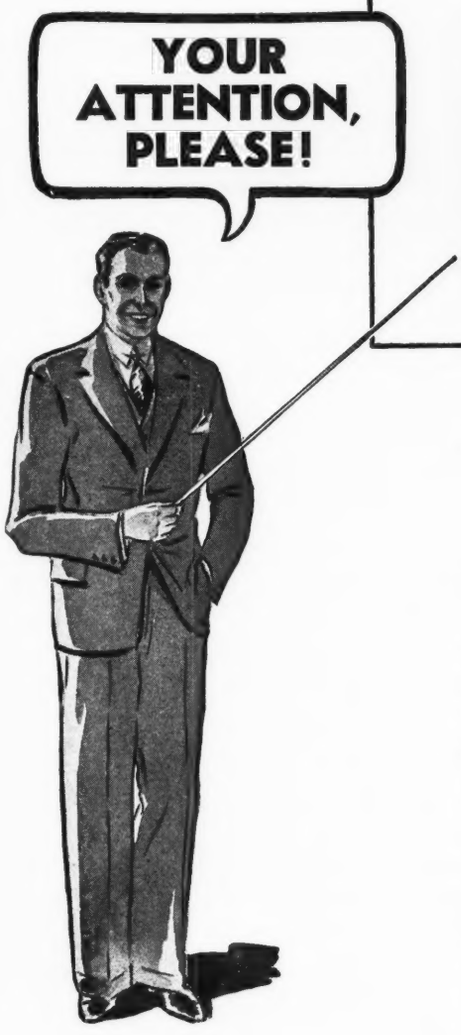

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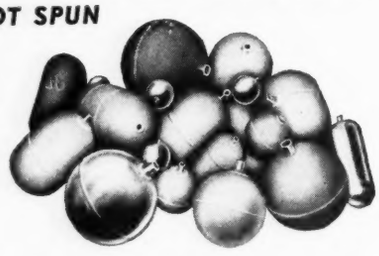

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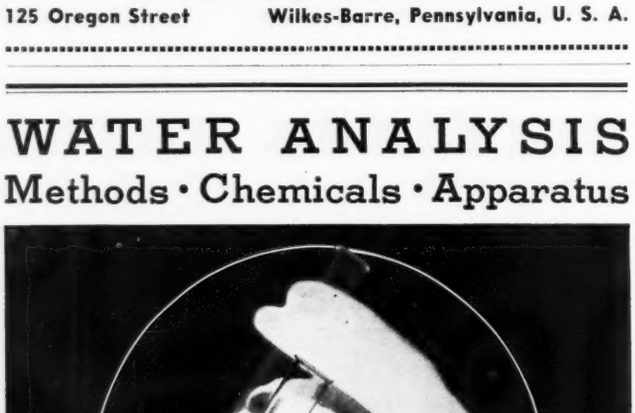

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Pittsburgh Piping & Equip Co, 12 43rd St, Pittsburgh, Pa.
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Adv pages 32-33
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(See Valves, Float)

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Adv page 182

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Adv pages 183, 188
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Adv pages 141, 182, 190, 202, 211
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Adv pages 171, 176, 192, 221
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Adv page 235
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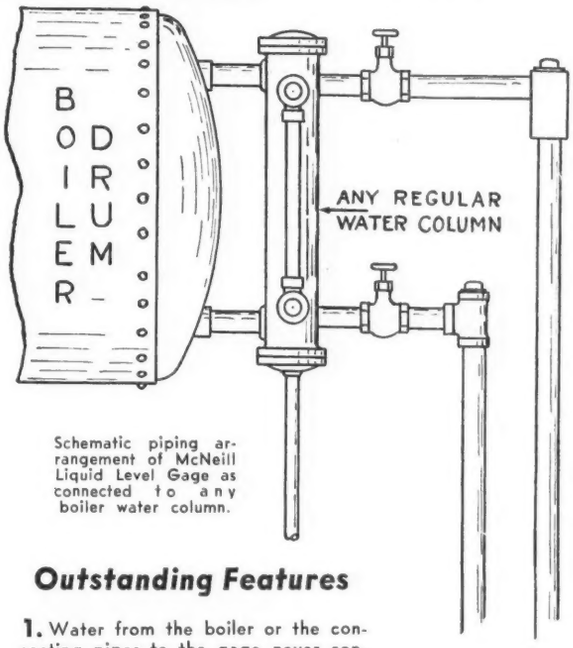

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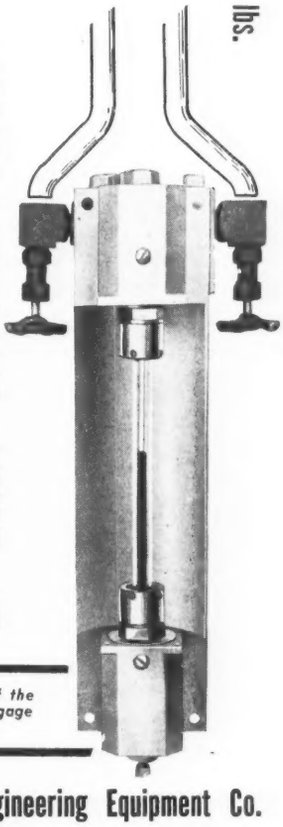

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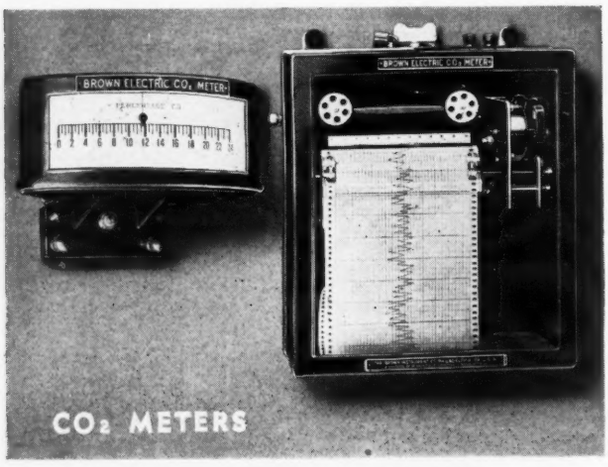

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Furnished in three types for recording from one to six readings on a single chart, 7" wide. Single point recorders record the per cent CO_2 on a full width chart, using an inked ribbon. Multiple models record from two to three CO_2 readings on a full width chart using a multi-colored ribbon. Multiple duplex models record from two to six readings on two sections of a full width chart, using two measuring systems and one multi-colored inked ribbon. Flue gas temperature can be recorded on same duplex chart with CO_2 reading. One, two or three temperatures and CO_2 readings can be recorded on the same duplex chart. Indicating reading is obtained directly on a 6" scale.

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Adv page 219

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Bailey Meter Co, 1036 Ivanhoe Rd, Cleveland, Ohio
Adv page 173
Bristol Co, Waterbury, Conn.
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Adv pages 141, 182, 190, 202, 211
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Crosby Steam Gage & Valve Co, 40 Church St, New York, N. Y.
Esterline-Angus Co, Box 596, Indianapolis, Ind.
Foxboro Co, 38 Neponset Ave, Foxboro, Mass.
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Logansport Machine, Inc, 914 Cotner Rd, Logansport, Ind.
Lonergan, J. E, Co, Race St, Philadelphia, Pa.
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Mercoid Corp, 4229 Belmont Ave, Chicago, Ill.
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Republic Flow Meters Co, 2222 Diversey Pkwy, Chicago, Ill.
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Uehling Instrument Co, 470 Getty Ave, Paterson, N. J.
U. S. Gauge Co, 44 Beaver St, New York, N. Y.
Adv page 182

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duPont de Nemours, E I, Co, National Ammonia Div, Phila, Pa.
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Hays Corp, 905 8th St, Michigan City, Ind.
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Adv pages 171, 176, 192, 221
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Endura Mfg Corp, Quakertown, Pa.
Ernst Water Column & Gage Co, Livingston, N. J.
Eureka Packing Co, 294–296 46th St, Brooklyn, N. Y.
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Felters Co, Inc, Dept LM, 210 South St, Boston, Mass.
Flexitallic Gasket Co, Camden, N. J.
Garlock Packing Co, 400 Main St, Palmyra, N. Y.
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Goetze Gasket & Packing Co, 10 Allen Av, New Brunswick, N. J.
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Goodsell Packing Co, 1803 Belle Plaine Ave, Chicago, Ill.
Houghton, E F, & Co, 244–250 W Somerset St, Phila, Pa.
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Keasbey & Mattison Co, Butler Pike, Ambler, Pa.
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Klingerit, Inc, 16 Hudson St, New York, N. Y.
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Reliance Electric & Engineering Co, 1068 Ivanhoe Rd, Cleveland, Ohio
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Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53

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(See Tubing, Glass)

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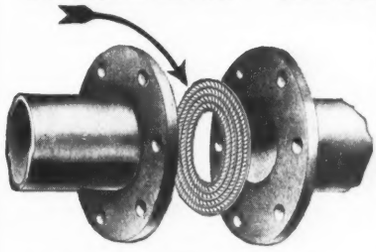

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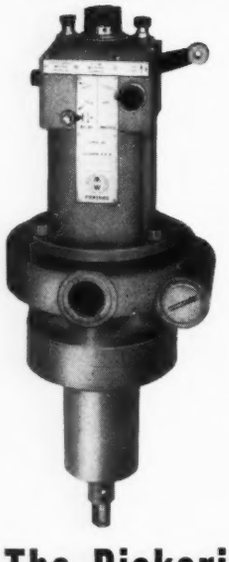

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Babcock & Wilcox Co, 85 Liberty St, New York, N. Y.
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Brownell Co, 301 N Findlay St, Dayton, Ohio
Canton Stoker Corp, 741 Andrew Pl, Canton, Ohio
Adv page 208
Combustion Engrg Co, Inc, 200 Madison Ave, New York, N. Y.
Adv pages 42-43
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New England Boiler Grate Co, Indian Orchard, Mass.
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Adv pages 28-29
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(See Cups, Grease)

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Adv page 238
Galena Oil Corp, 547 E 5th St, Cincinnati, Ohio.
Harris, A W, Oil Co, Providence, R. I.
Ohio Grease Co, Loudonville, O.
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(See Compounds)

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Buckeye Portable Tool Co, Dayton, Ohio
Chicago Pneumatic Tool Co, 6–8 E 44th St, New York, N. Y.
Cleveland Pneumatic Tool Co, Cleveland, Ohio
Diehl Mfg Co, Elizabethport, N. J.
Dumore Co, Racine, Wis.
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
Helwig Mfg Co, St Paul, Minn.
Ideal Commutator Dresser Co, 1025 Park Ave, Sycamore, Ill.
Independent Pneumatic Tool Co, 600 W Jackson, Chicago, Ill.
Ingersoll-Rand Co, 11 Broadway, New York, N. Y.
Adv pages 38-39
Madison-Kipp Corp, Madison, Wis.
Mall Tool Co, 7740 S Chicago Ave, Chicago, Ill.
Millers Falls Co, 59 Wells St, Greenfield, Mass.
Safety Grinding Wheel & Machine Co, Springfield, Ohio
Schauer Machine Co, Cincinnati, Ohio
Skilsaw Inc, Elston Ave, Chicago, Ill.
Stanley Works, New Britain, Conn.
Stoody Co, Whittier, Calif.
Standard Electrical Tool Co, 1918 W 8th St, Cincinnati, O.
Syntron Co, 492 Lexington Ave, Homer City, Pa.
U. S. Electrical Motors, 200 E Slauson, Los Angeles, Calif.

GUNS, GREASE

Alemite Div, Stewart Warner Corp, 1826-1852 Diversey Pkwy, Chicago, Ill.
Lincoln Engrg Co, 5701 Natural Bridge Ave, St. Louis, Mo.
Royersford Foundry & Machine Co, Royersford, Pa.

GUNS, METAL-SPRAY

Master Metal Spray Co, 2527 Magnolia St, Oakland, Calif.
Adv page 185
Metallizing Co of America, Inc, P O Box 2822, Terminal Annex, Los Angeles, Calif.
Metallizing Engrg Co, 21-07 41st Ave, Long Island City, N. Y.
Metals Coating Co of America, Philadelphia, Pa.
Metalspray Co, 113 Llewellyn St, Los Angeles, Calif.
Schori Process Corp, 8-11 43rd Rd, Long Island City, N. Y.

HAMMERS, PNEUMATIC, ELECTRIC, PORTABLE

Barco Mfg Co, 1802½ Winnemac Ave, Chicago, Ill.
Chicago Pneumatic Tool Co, 6–8 E 44th St, New York, N. Y.
Cleveland Pneumatic Tool Co, Cleveland, Ohio
Dayton Pneumatic Tool Co, 7 Norwood Ave, Dayton, Ohio
Franklin Machine Co, Providence, R. I.
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
Helwig Mfg Co, St Paul, Minn.
Independent Pneumatic Tool Co, 600 W Jackson Blvd, Chicago, Ill.
Ingersoll-Rand Co, 11 Broadway, New York, N. Y.
Adv pages 38-39
Keller, William H, Inc, Grand Haven, Mich.
King Pneumatic Tool Co, N Ashland Ave, Chicago, Ill.
Madison-Kipp Corp, Madison, Wis.
Mall Tool Co, 7740 S Chicago Ave, Chicago, Ill.
Millers Falls Co, 59 Wells St, Greenfield, Mass.
Mueller Co, Decatur, Ill.
Syntron Co, 492 Lexington Ave, Homer City, Pa.
Whitney, W A, Mfg Co, Rockford, Ill.

HANGERS, PIPE

Grinnell Co, Inc, 277 W Exchange St, Providence, R. I.
Adv page 119
Jarecki Mfg Co, Erie, Pa.
Adv page 242
Kellogg, M W, Co, Jersey City, N. J.
Adv page 48
Limbert, Geo B, & Co, 570 Fulton St, Chicago, Ill.
McDougall & Potter Co, 141st St & Rider Ave, New York, N. Y.
National Valve & Mfg Co, 3102 Liberty Ave, Pittsburgh, Pa.
Adv page 232
Pittsburgh Valve & Fittings Corp, Barberton, Ohio
Rockwood Sprinkler Co, 54 Harlow St, Worcester, Mass.

HANGERS, SHAFT, & PILLOW BLOCKS

American Pulley Co, Phila, Pa.
Barry Co, Muscatine, Iowa.
Bartlett & Snow, C O, Co, Cleveland, Ohio
Adv page 151
Bass Foundry & Machine Co, Fort Wayne, Ind.
Bond, Charles, Co, 617-623 Arch St, Philadelphia, Pa.
Boston Gear Works, Inc, North Quincy, Mass.
Caldwell, W E, Co, 280 Brandeis St, Louisville, Ky.
Carey, W W, Co, Lowell, Mass.
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Clizbe Bros Mfg Co, Plymouth, Ind.
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Dodge Mfg Corp, Mishawaka, Ind.
Falls Clutch & Machinery Co, Cuyahoga Falls, Ohio
Fast Bearing Co, Baltimore, Md.
Franklin Machine Co, Providence, R. I.
Goldens' Foundry & Machine Co, Columbus, Ga.
Great Western Mfg Co, Leavenworth, Kan.
H & C Machinery & Engrg Co, 281 Passaic St, Newark, N. J.
Hill Acme Co, 6400 Breakwater Ave, Cleveland, Ohio
Jeffrey Mfg Co, 932-99 N 4th St, Columbus, Ohio
Jones, W A, Foundry & Machine Co, 4423 W Roosevelt Rd, Chicago, Ill.
Kingsbury Machine Works, 4324 Tackawanna St, Phila, Pa.
Link-Belt Co, 300 W Pershing Rd, Chicago, Ill.
Adv page 3
Medart Co, 3548 De Kalb St, St Louis, Mo.
Palmer-Bee Co, Detroit, Mich.
Randall Graphite Products Corp, Chicago, Ill.
Robins Conveying Belt Co, Passaic, N. J.
Royersford Foundry & Machine Co, 75 Main St, Royersford, Pa.
Sackett, A J, & Sons, Baltimore, Md.
S K F Industries, Inc, Front St & Erie Ave, Philadelphia, Pa.
Smith, Winfield H, Inc, 330 West St, Springville, Ohio
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Adv pages 163, 185
Wood's, T B, Sons Co, 1165 5th Ave, Chambersburg, Pa.

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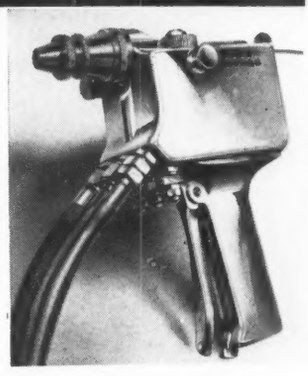

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Adv pages 186, 192, 206, 214
Hoppes Mfg Co, Belmont Ave, Springfield, Ohio
Kieley & Mueller, Inc, 40 W Thirteenth St, New York, New York.
Milwaukee Steam Appliance Co, West Allis, Wis.
Plouff Co, 1150 Columbus Ave, Boston, Mass.
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Adv pages 20-21
Wright-Austin Co, Detroit, Mich.

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Alco Products Div, 36 Church St, New York, N. Y.
Andale Co, 1600 Arch St, Philadelphia, Pa.
Babcock & Wilcox Co, 85 Liberty St, New York, N. Y.
Adv pages 4-5
Braun, C F & Co, 1000 South Fremont Ave, Alhambra, California.
Buffalo Forge Co, 488 Broadway, Buffalo, N. Y.
Adv page 160
Cochrane Corp, 3106 N 17th St, Philadelphia, Pa.
Adv pages 186, 192, 206, 214
Croll-Reynolds Engrg Co, 17 John St, New York, N. Y.
Adv page 177
Davis Engrg Corp, 1064-16 E Grand St, Elizabeth, N. J.
Devine, J P, Mfg Co, Inc, Mt Vernon, Ill.
Duriron Co, Inc, Dayton, Ohio
Elgin Softener Corp, 55 North St, Elgin, Ill.
Elliott Co, Jeannette, Pa.
Adv pages 6-7
Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 24-25
Griscom-Russell Co, 285 Madison Ave, New York, N. Y.
Heilman Boiler Works, Allentown, Pa.
Henszey Co, Dept D-14 Watertown, Wis.
Adv pages 164, 188, 191, 203
Hoppes Mfg Co, Belmont Ave, Springfield, Ohio
Kellogg, M W, Co, Jersey City, N. J.
Adv page 48
Leader Iron Works, Inc, Decatur, Ill.
Leahy Mfg Co, E 8th St, Los Angeles, Calif.
Lummus Co, 420 Lexington Ave, New York, N. Y.
Marley Co, Fairfax Rd & Marley Ave, Kansas City, Kan.
Adv page 30
Midwest-Fulton Machine Co, Dayton, Ohio
Pennsylvania Pump & Compressor Co, Easton, Pa.
Petroleum Iron Works Co, Sharon, Pa.
Prat-Daniel Corp, 80 S Water St, Port Chester, Pa.
Adv pages 169, 207
Richmond Engrg Co, 7th & Hospital Sts, Richmond, Va.
Rome-Turney Radiator Co, 200 Lynch St, Rome, N. Y.
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Vogt, Henry, Machine Co, 1000 W Ormsby St, Louisville, Ky.
Adv page 217
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53
Wheeler, C H, Mfg Co, Lehigh & Sedgley Aves, Phila, Pa.
Worthington Pump and Machinery Corp, Harrison, N. J.
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(See Paints, Heat-Resistant)

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(See Insulation)

HEATERS, AIR

(See Preheaters, Air)

HEATERS, DEAERATING

Brownell Co, 301 N Findlay St, Dayton, Ohio
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Adv pages 186, 192, 206, 214
Condenser Service & Engrg Co, 310 12th St, Hoboken, N. J.
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Adv page 177
Elliott Co, Jeannette, Pa.
Adv pages 6-7
Foster Wheeler Corp, 165 Broadway, New York, N. Y.
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Adv page 138
Power Plant Specialty Co, 440 S Dearborn, Chicago, Ill.
Stickle Steam Specialties Co 2217 Valley Ave, Indianapolis Ind.
Swartwout Co, 18501 Euclid Ave, Cleveland, Ohio
Adv pages 20-21
Worthington Pump & Machinery Corp, Harrison, N. J.

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Cochrane Corp, 3106 N 17th St, Philadelphia, Pa.
Adv pages 186, 192, 206, 214
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Croll-Reynolds Engrg Co, 17 John St, New York, N. Y.
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Davis Engrg Corp, 1064-16 E Grand St, Elizabeth, N. J.
Elliott Co, Jeannette, Pa.
Adv pages 6-7
Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 24-25
Graver Tank & Mfg Co, Inc, East Chicago, Ind.
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Marshall Heater Co, Dayton, O.
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Power Plant Specialty Co, 440 S Dearborn, Chicago, Ill.
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Schutte & Koerting Co, 12th & Thompson Sts, Phila, Pa.
Stickle Steam Specialties Co, 2217 Valley Ave, Indianapolis, Ind.
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Adv pages 4-5
Black, Sivalls & Bryson, Inc, Oklahoma City, Okla.
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Coen Co, 40 Boardman Place, San Francisco, Calif.
Combustion Equipment Co, 1820 Cherry St, Kansas City, Mo.
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Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 24-25
Griscom-Russell Co, 285 Madison Ave, New York, N. Y.
Hauck Mfg Co, 126 10th St, Brooklyn, N. Y.
Hynes Electric Heating Co, 240 Cherry St., Philadelphia, Pa.
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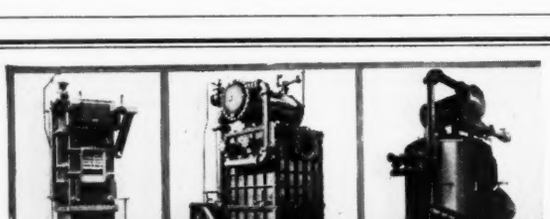

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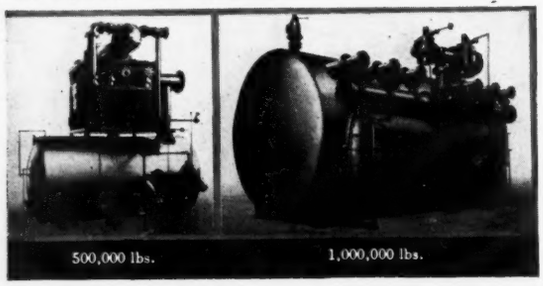

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Bryant Heater Co, 17825 St Clair Ave, Cleveland, Ohio
Buffalo Forge Co, 488 Broadway, Buffalo, N. Y.
Adv page 160
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Clarage Fan Co, 621 Porter St, Kalamazoo, Mich.
Adv page 147
Crane Co, 836 S Michigan Ave, Chicago, Ill.
Adv page 113
Dunham, C A, Co, 450 E Ohio St, Chicago, Ill.
Fedders Mfg. Co, 63 Tonawanda St, Buffalo, N. Y.
Adv page 187
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
Johnson Fan & Blower Corp, Dept P, 1319 W Lake, Chicago, Ill.
Kisco Co, 3736 Chouteau Ave, St Louis, Mo.
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McQuay, Inc, Minneapolis, Minn.
Modine Mfg Co, Racine, Wis.
Murray, D J, Mfg Co, Wausau, Wis.
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Nelson, Herman, Corp, 1840 Horton Ave, Moline, Ill.
Nesbitt, John J, Inc, State Rd & Rhawn St, Philadelphia, Pa.
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Rome-Turney Radiator Co, 200 Lynch St, Rome, N. Y.
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Webster, Warren, & Co, Camden, N. J.
Adv page 213
Wing, L J, Mfg Co, W 14th St, & 7th Ave, New York, N. Y.
Adv page 164
Young Radiator Co, Racine, Wis.

HEATERS, WATER-SUPPLY

Alberger Heater Co, 287 Chicago St, Buffalo, N. Y.
American District Steam Co, 70 Bryant St, N Tonawanda, N. Y.
Adv page 242
American Radiator Co, 40 W 40th St, New York, N. Y.
Andale Co, 1600 Arch St, Philadelphia, Pa.
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Adv page 177
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Eclipse Fuel Engrg Co, 707 So Main St, Rockford, Ill.
Johansen Water Heater Co, 817 W Webster Ave, Chicago, Ill.
Johnson, S T, Co, 940 Arlington, Oakland, Calif.
Marion Machine Foundry & Supply Co, Marion, Ind.
McDermott Water Heaters, Inc, 1819 Broadway, New York, N. Y.
Quaker City Iron Works, Philadelphia, Pa.
Ray Oil Burner Co, 401 Bernal Ave, San Francisco, Calif.
Ross Heater & Mfg Co, 1409 West Ave, Buffalo, N. Y.
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Tallmadge, Webster, & Co, 255 N 18th St, East Orange, N. J.
Trane Co, 2012 Cameron Ave, La Crosse, Wis.
U. S. Radiator Corp, Detroit, Mich.
Webster, Warren, & Co, Camden, N. J.
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HEMP PACKING

(See Packing, Hemp)

HOISTS, HAND

American Chain Co, York, Pa.
Beebe Bros, Inc, 2724 Sixth Ave, S, Seattle, Wash.
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Chisholm-Moore Hoist Corp, 6015 Fremont Ave, Tonawanda, N. Y.
Cleveland Crane & Engrg Co, Wickliffe, Ohio
Conco Engrg Works, Mendota, Ill.
Ford Chain Block Div, American Chain & Cable Co, York, Pa.
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
Harrington Co, Philadelphia, Pa.
McCollom Hoist & Mfg Co, Downers Grove, Ill.
Reading Chain & Block Corp, 2100 Adams St, Reading, Pa.
Robbins & Myers, Inc, Springfield, Ohio
Roeper Crane & Hoist Works, 1729 N Tenth St, Reading, Pa.
Stephens-Adamson Mfg Co, 5 Ridgeway Ave, Aurora, Ill.
Union Mfg Co, New Britain, Conn.
Wright Mfg Div, American Chain & Cable Co, York, Pa.
Yale & Towne Mfg Co, Stamford, Conn.

HOISTS, ELECTRIC, PNEUMATIC

American Chain Co, York, Pa.
American Engrg Co, Aramingo Ave, Philadelphia, Pa.
Adv pages 12-13
American Hoist & Derrick Co, St Paul, Minn.
Chisholm-Moore Hoist Corp, 6015 Fremont Ave, Tonawanda, N. Y.
Cleveland Crane & Engrg Co, Wickliffe, Ohio
Clyde Iron Works, Duluth, Minn.
Conco Engrg Works, Mendota, Ill.
Curtis Pneumatic Machinery Co, 1934 Kien Ave, St. Louis, Mo.
Adv page 132
Dake Engine Co, 633 Monroe St, Grand Haven, Mich.
Detroit Hoist & Machine Co, Detroit, Mich.
Dravo Corp, Pittsburgh, Pa.
Euclid Crane & Hoist Co, Euclid, Ohio
Fairfield Engrg Co, 305 Barnhart St, Marion, Ohio
General Machinery Co, Spokane, Wash.
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
Harnischfeger Corp, Milwaukee, Wis.
Harrington Co, Philadelphia, Pa.
Ingersoll-Rand Co, 11 Broadway, New York, N. Y.
Adv pages 38-39
Lidgerwood Mfg Co, Elizabeth, N. J.
Louden Machinery Co, Fairfield, Iowa.
McCollum Hoist & Mfg Co, Downers Grove, Ill.
Northern Engrg Works, Detroit, Mich.
O K Clutch & Machinery Co, Columbia, Pa.
Reading Chain & Block Corp, 2100 Adams St, Reading, Pa.
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Sullivan Machinery Co, Michigan City, Ind.
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Wright Mfg Div, American Chain & Cable Co, York, Pa.
Yale & Towne Mfg Co, Stamford, Conn.

HOISTS, SKIP

Bartlett & Snow C O, Co, Cleveland, Ohio
Adv page 151
Beaumont-Birch Co, Philadelphia, Pa.
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Fairfield Engrg Co, 305 Barnhart St, Marion, Ohio
Gifford-Wood Co, 24 Hill St, Hudson, N. Y.
Godfrey Conveyor Co, Dept A-77, Elkhart, Ind.
Jeffrey Mfg Co, 932-99 N 4th St, Columbus, Ohio
Lidgerwood Mfg Co, Elizabeth, N. J.
Link-Belt Co, 300 W Pershing Rd, Chicago, Ill.
Adv page 3
Palmer-Bee Co, Detroit, Mich.
Robins Conveying Belt Co, Passaic, N. J.
Stephens-Adamson Mfg Co, 5 Ridgeway Ave, Aurora, Ill.

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Adv pages 12-13
Bartlett & Snow, C O, Co, Cleveland, Ohio
Adv page 151
Bergen Point Iron Works, Bayonne, N. J.
Bethlehem Steel Co, Bethlehem, Pa.
Bos-Hatten, Inc, Buffalo, N. Y.
Brady Conveyors Corp, 20 W Jackson Blvd, Chicago, Ill.
Chain Belt Co, 1674 W Bruce St, Milwaukee, Wis.
Chattanooga Boiler & Tank Co, Box 110, Chattanooga, Tenn.
Chicago Bridge & Iron Co, 2454 McCormick Bldg, Chicago, Ill.
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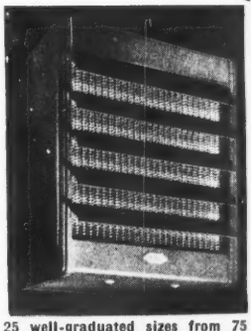

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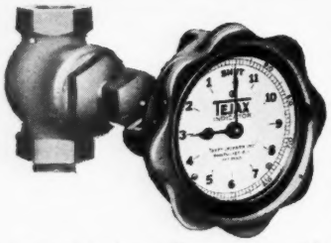

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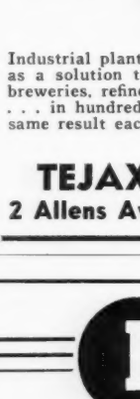

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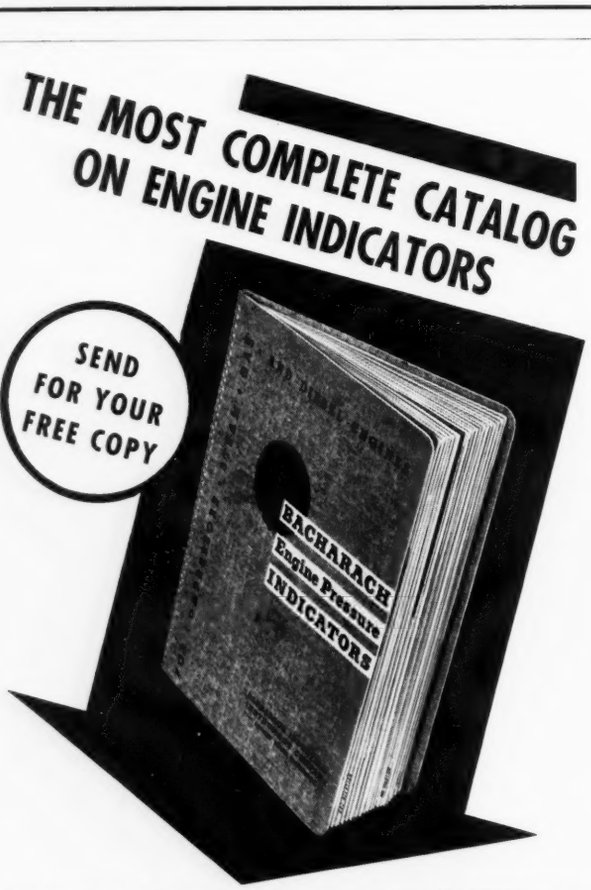

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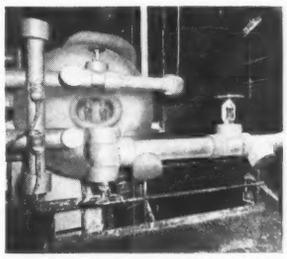

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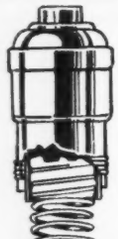

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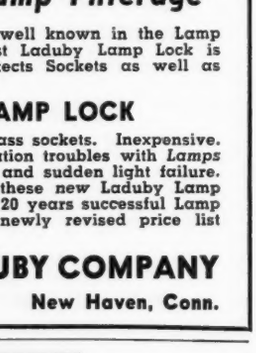

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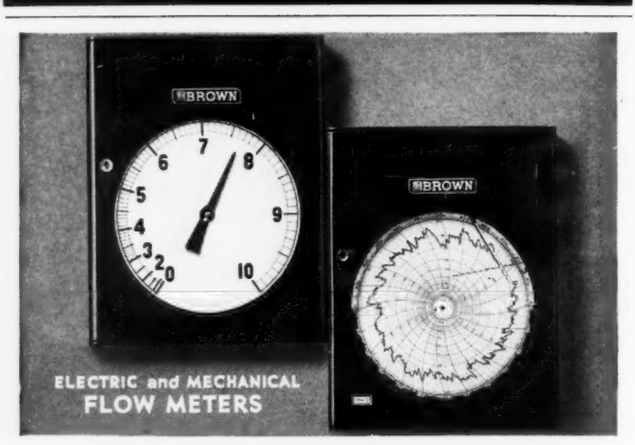

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Foster Wheeler Corp, 165 Broadway, New York, N. Y.
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Schieren, Chas A, Co, 30-39 Ferry St, New York, N. Y.
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Alemite Div, Stewart Warner Corp, 1826-1852 Diversey Pkwy, Chicago, Ill.
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Gardner-Denver Co, 100 Gardner Drive, Quincy, Ill.
Hunter Pressed Steel Co, 8000 Maple Ave, Lansdale, Pa.
Jarecki Mfg Co, Erie, Pa.
Adv page 242
Lincoln Engrg Co, 5701 Natural Bridge, St Louis, Mo.
Logansport Machine, Inc, 914 Cotner Rd, Logansport, Ind.
Lunkenheimer Co, Box 360, Annex Station, Cincinnati, O.
Adv pages 14-15
Manzel Bros Co, 326 Babcock St, Buffalo, N. Y.
McCord Radiator & Mfg Co, Detroit, Mich.
McCullough Mfg Co, 2636 Central Ave, N E, Minneapolis, Minn.
Adv page 190
Nathan Mfg Co, 250 Park Ave, New York, N. Y.
Norgren, C A, Co, 210 Santa Fe Drive, Denver, Colo.
Nugent, Wm W. & Co, Inc, 402 N Hermitage Ave, Chicago, Ill.
Ohio Grease Co, Loudonville, O.
Ohio Injector Co, Wadsworth, Ohio
Powell, Wm, Co, Cincinnati, O.
Adv pages 252-253
Torrington Mfg Co, Torrington, Conn.
Trico Fuse Mfg Co, 2955 N 5th St, Milwaukee, Wis.
U. S. Metallic Packing Co, Hamilton St, Philadelphia, Pa.
Williams, D T, Valve Co, 2854 Spring Grove, Cincinnati, O.

MANOMETERS

(See Gages, Draft)

MECHANICAL TRANSMISSIONS

(See Gear Units, Transmissions)

MEGOHMMETERS

Biddle, Jas G, Co, 1211-13 Arch St, Philadelphia, Pa.
Adv page 211
Esterline-Angus Co, Box 596, Indianapolis, Ind.

METAL-SPRAY EQUIPMENT

(See Guns, Metal-Spray)

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American Meter Co, Inc, 60 E 42nd St, New York, N. Y.
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Adv pages 183, 188
Bailey Meter Co, Inc, 1036 Ivanhoe Rd, Cleveland, Ohio.
Adv page 173
Bristol Co, Waterbury, Conn.
Brown Instrument Co, 4490 Wayne Ave, Philadelphia, Pa.
Adv pages 141, 182, 190, 202, 211
Clark, Chas J, Blast Meter Co, Gladbrook, Iowa.
Cochrane Corp, 3106 N 17th St, Philadelphia, Pa.
Adv pages 186, 192, 206, 214
Fischer & Porter Co, 59 W Queen Lane, Germantown, Pa.
Foxboro Co, 38 Neponset Ave., Foxboro, Mass.
Adv page 156
Friez, Julien P, & Sons, 4 N Central Ave, Baltimore, Md.
Republic Flow Meters Co, 2222 Diversey Pkwy, Chicago, Ill.
Adv pages 171, 176, 192, 221
Roots-Connersville Blower Corp, Connersville, Ind.
Schutte & Koerting Co, 12th & Thompson Sts, Phila, Pa.
Simplex Valve & Meter Co, 6780 Upland St, Philadelphia, Pa.
Adv page 136

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Adv page 111

METERS, CO_2

(See Gas Analyzers)

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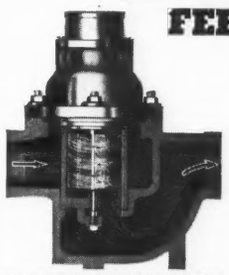
American District Steam Co, 70 Bryant St, N Tonawanda, N. Y.
Adv page 242

HENSZEY



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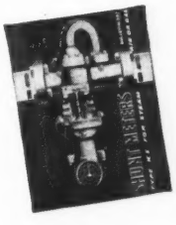

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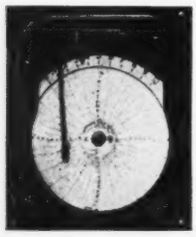
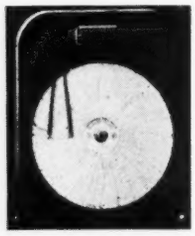


Electric Flow Meter

Mechanical Flow Meter



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Bristol Co, Waterbury, Conn.
Brown Instrument Co, 4490 Wayne Ave., Philadelphia, Pa.
Adv pages 141, 182, 190, 202, 211
Buffalo Meter Co, 2887 Main St, Buffalo, N. Y.
Builders Iron Foundry, 7 Codding St, Providence, R. I.
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Cochrane Corp, 3106 N 17th St, Philadelphia, Pa.
Adv pages 186, 192, 206, 214
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Foxboro Co, 38 Neponset Ave, Foxboro, Mass.
Adv page 156
Henszey Co, Dept D-14, Watertown, Wis.
Adv pages 164, 188, 191, 203
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Leeds & Northrup Co, 4970 Stenton Ave, Philadelphia, Pa.
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Mason-Neilan Regulator Co, 1186 Adams St, Boston, Mass.
Morey & Jones, Ltd, Room 1010, 922 S Hemlock St, Los Angeles, Calif.
Republic Flow Meters Co, 2222 Diversey Pkwy, Chicago, Ill.
Adv pages 171, 176, 192, 221
Schutte & Koerting Co, 12th & Thompson Sts, Philadelphia, Pa.
Simplex Valve & Meter Co, 6780 Upland St, Philadelphia, Pa.
Adv page 136
Spray Engrg Co, 114 Central St., Somerville, Pa.
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Taylor Instrument Cos, Rochester, N. Y.
Adv page 235

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Leeds & Northrup Co, 4970 Stenton Ave, Philadelphia, Pa.
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Roller-Smith Co, 1766 W Market St., Bethlehem, Pa.
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
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Weston Electrical Instrument Corp, 614 Frelinghuysen Ave, Newark, N. J.
Adv pages 163, 210

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Brown Instrument Co, 4490 Wayne Ave, Philadelphia, Pa.
Adv pages 141, 182, 190, 202, 211
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Diehl Mfg Co, Elizabethport, N. J.
Elliott Co, Ridgeway, Pa.
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Erie Electric Co, 124 Church St, Buffalo, N. Y.
Adv page 212
Fairbanks, Morse & Co, 600 S Michigan Ave., Chicago, Ill.
Forbes & Myers, 174 Union St, Worcester, Mass.
General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
Ideal Electric & Mfg Co, Mansfield, Ohio
Janette Mfg Co, 556 W Monroe St, Chicago, Ill.
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Adv pages 52-53

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Arrow-Hart & Hegeman Electric Co, 105 Hawthorne St, Hartford, Conn.
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Cutler-Hammer, Inc, 606 N 12th St, Milwaukee, Wis.
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General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
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Rowan Controller Co, 2313 Homewood Ave, Baltimore, Md.
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Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53

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Adv pages 11, 18-19, 107, 256
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Logansport Machine, Inc, 914 Cotner Rd, Logansport, Ind.
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Staynew Filter Corp, Rochester, N. Y.
Adv page 241

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Adv page 160
Burhorn, Edwin, Co, 554 W 48th St, New York, N. Y.
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Adv pages 193, 201
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Adv page 3
Marley Co, Fairfax Rd & Marley Ave, Kansas City, Kan.
Adv page 30
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Adv pages 101, 178, 193, 218, 224

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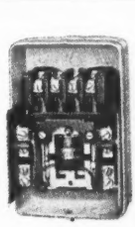

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(See Also Burners, Oil)

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Adv page 166
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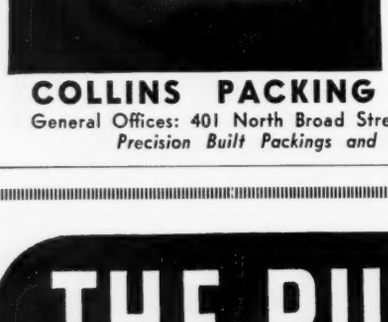

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Adv page 133
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Petroleum Heat & Power Co, Stamford, Conn.
Pure Oil Co, Chicago, Ill.
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Shell Oil Co, 50 W 50th St, New York, N. Y.
Sinclair Refining Co, 630 5th Ave, New York, N. Y.
Adv page 45
Socony-Vacuum Oil Co, Inc, 26 Broadway, New York, N. Y.
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Standard Oil Co, N. J., 26 Broadway, New York, N. Y.
Sun Oil Co, Philadelphia, Pa.
Texas Co, 135 E 42nd St, New York, N. Y.
Adv page 34
Tidewater Assoc Oil Co, 17 Battery Place, New York, N. Y.
Adv pages 28-29
Valvoline Oil Co, 547 E 5th St, Cincinnati, Chio

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Gulf Oil Corp, Gulf Bldg, Pittsburgh, Pa.
Adv page 133
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Ilsley, Doubleday, & Co, 56-14 Nurge Ave, Maspeth, N. Y.
Kellogg, E H, & Co, 93 Water St, New York, N. Y.
Keystone Lubricating Co, 21st & Clearfield, Phila, Pa.
Lion Oil Refining Co, El Dorado, Ark.
Macmillan Petroleum Corp, 5[illegible] W 6th St, Los Angeles, Cali[illegible]
Ohio Grease Co, Loudonville, O.
Ohio Oil Co, Findlay, Ohio
Adv page 143
Pennzoil Co, Oil City, Pa.
Pure Oil Co, Chicago, Ill.
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Shell Oil Co, 50 W 50th St, New York, N. Y.
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Socony-Vacuum Oil Co, Inc, 26 Broadway, New York, N. Y.
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Sun Oil Co, Philadelphia, Pa.
Swan-Finch Oil Corp, RCA Bldg, W, New York, N. Y.
Texas Co, 135 E 42nd St, New York, N. Y.
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Tidewater Assoc Oil Co, 17 Battery Pl, New York, N. Y.
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Valvoline Oil Co, 547 E 5th St, Cincinnati, Ohio

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(See Valve Operators, Motor)

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Belmont Packing & Rubber Co, East Butler & Sepviva Sts, Philadelphia, Pa.
Carey, Philip, Co, Lockland, O.
Adv page back cover
Cincinnati Rubber Mfg Co, 4901 Franklin Ave, Norwood, Cincinnati, Ohio
Collins Packing Co, 401 N Broad St, Philadelphia, Pa.
Adv page 194
Crane Packing Co, 1801 Cuyler Ave, Chicago, Ill.
Darcoid Co, Inc, 145 Sixth Ave, New York, N. Y.
Durabla Mfg Co, Room, 202, 114 Liberty St, New York, N. Y.
Ehret Magnesia Mfg Co, Inc, Valley Forge, Pa.
Adv page 231
Eureka Packing Co, 294–296 46th St, Brooklyn, N. Y.
Adv page 196
France Packing Co, 6512 Tacony St, Tacony, Philadelphia, Pa.
Garlock Packing Co, 400 Main St, Palmyra, N. Y.
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Goetze Gasket & Packing Co, 10 Allen Ave, New Brunswick, N. J.
Adv page 183

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Jenkins Bros, 80 White St, New York, N. Y.
Adv pages 108-109
Johns-Manville, 22 E 40th St, New York, N. Y.
Adv pages 36-37
Keasbey & Mattison Co, Butler Pike, Ambler, Pa.
Adv page 150
Klingerit, Inc, 16 Hudson St, New York, N. Y.
Adv page 220
Linear Packing & Rubber Co, State Rd & Levick St, Phila, Pa.
Savage Packing & Engrg Co, 1029 Clinton St, Hoboken, N. J.
Sea-Ro Packing Co, 73 West St, New York, N. Y.
Adv page 195
Thermoid Co, Whitehead Rd, Trenton, N. J.
Union Asbestos & Rubber Co, 1821 S 54th Ave, Cicero, Ill.
U. S. Rubber Co, 1230 6th Ave, New York, N. Y.
Vellumoid Co, 54 Rockdale St, Worcester, Mass.
Walker, James, Packing Co, 98 Liberty St, New York, N. Y.

PACKING, FELT

American Felt Co, 315 4th Ave, New York, N. Y.
Adv page 194
Booth Felt Co, 463 19th St, Brooklyn, N. Y.
Felters Co, Inc, Dept LM, 210 South St, Boston, Mass.
Johns-Manville, 22 E 40th St, New York, N. Y.
Adv pages 36-37
Western Felt Works, 4117 Ogden Ave, Chicago, Ill.

PACKING, FIBRE

Allpax Co, Mamaroneck, N. Y.
Cincinnati Rubber Mfg Co, 4901 Franklin Ave, Norwood, Cincinnati, Ohio
Collins Packing Co, 401 N Broad St, Philadelphia, Pa.
Adv page 194
Crane Packing Co, 1801 Cuyler Ave, Chicago, Ill.
Endura Mfg Co, Quakertown, Pa.
Garlock Packing Co, 400 Main St, Palmyra, N. Y.
Adv pages 125, 195
Goodsell Packing Co, 1803 Belle Plaine Ave, Chicago, Ill.
Greene, Tweed & Co, Room 805, 101 Park Ave, New York, N. Y.
Adv page 140
Johns-Manville, 22 E 40th St, New York, N. Y.
Adv pages 36-37
Vellumoid Co, 54 Rockdale St, Worcester, Mass.
Wayne Davies Packings, Inc, 325 W Huron St, Chicago, Ill.

PACKING, FLAX

Anchor Packing Co, 401 N Broad St, Philadelphia, Pa.
Belmont Packing & Rubber Co, E Butler & Sepviva Sts, Philadelphia, Pa.
Collins Packing Co, 401 N Broad St, Philadelphia, Pa.
Adv page 194
Crane Packing Co, 1801 Cuyler Ave, Chicago, Ill.
Darcoid Co, Inc, 145 6th Ave, New York, N. Y.
Eureka Packing Co, 294–296 46th St, Brooklyn, N. Y.
Adv page 196
Garlock Packing Co, 400 Main St, Palmyra, N. Y.
Adv pages 125, 195
Goetze Gasket & Packing Co, 10 Allen Ave, New Brunswick, N. J.
Adv page 183
Goodsell Packing Co, 1803 Belle Plaine Ave, Chicago, Ill.
Johns-Manville, 22 E 40th St, New York, N. Y.
Adv pages 36-37
Linear Packing & Rubber Co, State Rd & Levick St, Phila, Pa.
Savage Packing & Engrg Co, 1029 Clinton St, Hoboken, N. J.
Union Asbestos & Rubber Co, 1821 So 54th Ave, Cicero, Ill.
Walker, James, Packing Co, 98 Liberty St, New York, N. Y.

PACKING, HEMP, JUTE

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Crane Packing Co, 1801 Cuyler Ave, Chicago, Ill.
Garlock Packing Co, 400 Main St, Palmyra, N. Y.
Adv pages 125, 195
Goetze Gasket & Packing Co, 10 Allen Ave, New Brunswick, N. J.
Adv page 183
Goodsell Packing Co, 1803 Belle Plaine Ave, Chicago, Ill.
Johns-Manville, 22 E 40th St, New York, N. Y.
Adv pages 36-37

PACKING, HYDRAULIC

Belmont Packing & Rubber Co, E Butler & Sepviva Sts, Philadelphia, Pa.
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Collins Packing Co, 401 N Broad St, Philadelphia, Pa.
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Crane Packing Co, 1801 Cuyler Ave, Chicago, Ill.
Darcoid Co, Inc, 145 6th Ave, New York, N. Y.
Federal Metallic Packing Co, 29-99 Foundry St, Wakefield, Mass.
Garlock Packing Co, 400 Main St, Palmyra, N. Y.
Adv pages 125, 195
Goetze Gasket & Packing Co, 10 Allen Ave, New Brunswick, N. J.
Adv page 183
Goodrich, B F, Co, 460 S Main St, Akron, Ohio
Goodsell Packing Co, 1803 Belle Plaine Ave, Chicago, Ill.
Greene, Tweed & Co, Room 805, 101 Park Ave, New York, N. Y.
Adv page 140
Houghton, E F & Co, 244-50 W Somerset St, Phila, Pa.
Johns-Manville, 22 E 40th St, New York, N. Y.
Adv pages 36-37
Mabbs Hydraulic Packing Co, Manhattan Bldg, Chicago, Ill.
Marlo Co, 60 Grand St, New York, N. Y.
Quaker City Rubber Co, Comly & Milnor Sts, Phila, Pa.
Sea-Ro Packing Co, 73 West St, New York, N. Y.
Adv page 195
Walker, James, Packing Co, 98 Liberty St, New York, N. Y.
Wayne Davies Packings, Inc, 325 W Huron St, Chicago, Ill.

PACKING, LEATHER

Alexander Bros, 410 N 3rd St, Philadelphia, Pa.
Anchor Packing Co, 401 N Broad St, Philadelphia, Pa.
Baldwin Belting & Leather Co, 85 Chambers St, New York, N. Y.
Collins Packing Co, 401 N Broad St, Philadelphia, Pa.
Adv page 194
Crane Packing Co, 1801 Cuyler Ave, Chicago, Ill.
Eagle Belting & Leather Co, 1405 Central Pkwy, Cincinnati, O.
Garlock Packing Co, 400 Main St, Palmyra, N. Y.
Adv pages 125, 195
Goodsell Packing Co, 1803 Belle Plaine Ave, Chicago, Ill.
Graton & Knight, Worcester, Mass.
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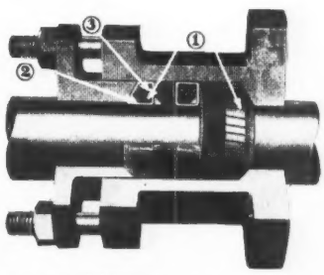

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Schieren, Chas A, Co, 30-39 Ferry St, New York, N. Y.
Watson-Stillman Co, Roselle, N. J.
Adv page 126
Wayne Davies Packings, Inc, 325 W Huron St, Chicago, Ill.

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Belmont Packing & Rubber Co, E Butler & Sepviva Sts, Philadelphia, Pa.
Collins Packing Co, 401 N Broad St, Philadelphia, Pa.
Adv page 194
Conneaut Packing Co, 200 Main St, Conneaut, Ohio
Cook, C Lee, Mfg Co, 916 S 8th St, Louisville, Ky.
Crane Packing Co, 1801 Cuyler Ave, Chicago, Ill.
Durametallic Corp, Kalamazoo, Mich.
Ehret Magnesia Mfg. Co, Inc, Valley Forge, Pa.
Adv page 231
Eureka Packing Co, 294–296 46th St, Brooklyn, N. Y.
Adv page 196
France Packing Co, 6512 Tacony St, Tacony, Philadelphia, Pa.
Garlock Packing Co, 400 Main St, Palmyra, N. Y.
Adv pages 125, 195
Goetze Gasket & Packing Co, 10 Allen Ave, New Brunswick, N. J.
Adv page 183
Goodsell Packing Co, 1803 Belle Plaine Ave, Chicago, Ill.
Holmes Metallic Packing Co, 45 Westminster, Wilkes - Barre, Pa.
Huhn Mfg Co, 1395 Sedgwick Ave, New York, N. Y.
Johns-Manville, 22 E 40th St, New York, N. Y.
Adv pages 36-37
Marlo Co, 60 Grand St, New York, N. Y.
Mellor Packing Mfg Co, 332 Ocean Ave, Jersey City, N. J.
Metalastic Mfg Corp, 566 Broad St, Glen Rock, N. J.
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Savage Packing & Engrg Co, 1029 Clinton St, Hoboken, N. J.
Tripp Metallic Packing Co, Washington St, Boston, Mass.

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Anchor Packing Co, 401 N Broad St, Philadelphia, Pa.
Belmont Packing & Rubber Co, E Butler & Sepviva Sts, Phila, Pa.
Chesterton, A W, Co, 64 India St, Boston, Mass.
Cincinnati Rubber Mfg Co, 4901 Franklin Ave, Norwood, Cincinnati, Ohio
Collins Packing Co, 401 N Broad St, Philadelphia, Pa.
Adv page 194
Crane Packing Co, 1801 Cuyler Ave, Chicago, Ill.
Darcoid Co, Inc, 145 6th Ave, New York, N. Y.
Eureka Packing Co, 294–296 46th St, Brooklyn, N. Y.
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Garlock Packing Co, 400 Main St, Palmyra, N. Y.
Adv pages 125, 195
Goetze Gasket & Packing Co, 10 Allen Ave, New Brunswick, N. J.
Adv page 183
Goodrich, B F, Co, 460 S Main St, Akron, Ohio
Goodsell Packing Co, 1803 Belle Plaine Ave, Chicago, Ill.
Goodyear Tire & Rubber Co, 1144 E Market St, Akron, Ohio
Hewitt Rubber Corp, Buffalo, N. Y.
Jenkins Bros, 80 White St, New York, N. Y.
Adv pages 108-109
Johns-Manville, 22 E 40th St, New York, N. Y.
Adv pages 36-37
Linear Packing & Rubber Co, State Rd & Levick St, Phila, Pa.
Quaker City Rubber Co, Com[illegible] & Milnor Sts, Philadelphia, Pa.
Republic Rubber Div, Lee Tire & Rubber Corp, Youngstown, Ohio
Thermoid Co, Whitehead Rd, Trenton, N. J.
Union Asbestos & Rubber Co, 1821 So 54th Ave, Cicero, Ill.
U. S. Rubber Co, 1230 6th Ave, New York, N. Y.
Walker, James, Packing Co, 98 Liberty St, New York, N. Y.
Western Rubber Co, Goshen, Ind.

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Belmont Packing & Rubber Co, E Butler & Sepviva Sts, Phila, Pa.
Collins Packing Co, 401 N Broad St, Philadelphia, Pa.
Adv page 194
Crane Packing Co, 1801 Cuyler Ave, Chicago, Ill.
Darcoid Co, Inc, 145 6th Ave, New York, N. Y.
Durametallic Corp, Kalamazoo, Mich.
Federal Metallic Packing Co, 29-99 Foundry St, Wakefield, Mass.
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Garlock Packing Co, 400 Main St, Palmyra, N. Y.
Adv pages 125, 195
Goodsell Packing Co, 1803 Belle Plaine Ave, Chicago, Ill.
Johns-Manville, 22 E 40th St, New York, N. Y.
Adv pages 36-37
Linear Packing & Rubber Co, State Rd & Levick St, Phila, Pa.
Marlo Co, 60 Grand St, New York, N. Y.
Metalastic Mfg Corp, 566 Broad St, Glen Rock, N. J.
Rains Wood-Metal Packings, Spokane, Wash.
Sea-Ro Packing Co, 73 West St, New York, N. Y.
Adv page 195
Union Asbestos & Rubber Co, 1821 So 54th Ave, Cicero, Ill.
Walker, James, Packing Co, 98 Liberty St, New York, N. Y.

PACKING, SHEET

Anchor Packing Co, 401 N Broad St, Philadelphia, Pa.
Belmont Packing & Rubber Co, E Butler & Sepviva Sts, Phila, Pa.
Chicago Wilcox Mfg Co, 7701 Avalon Ave, Chicago, Ill.
Cincinnati Rubber Mfg Co, 4901 Franklin Ave, Norwood, Cincinnati, Ohio
Collins Packing Co, 401 N Broad St, Philadelphia, Pa.
Adv page 194
Crane Packing Co, 1801 Cuyler Ave, Chicago, Ill.
Darcoid Co, Inc, 145 6th Ave, New York, N. Y.
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Eureka Packing Co, 294–296 46th St, Brooklyn, N. Y.
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Garlock Packing Co, 400 Main St, Palmyra, N. Y.
Adv pages 125, 195
Goetze Gasket & Packing Co, 10 Allen Ave, New Brunswick, N. J.
Adv page 183
Goodrich, B F, Co, 460 S Main St, Akron, Ohio
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Dixon, Joseph, Crucible Co, 170 Wayne St, Jersey City, N. J.
Adv page 238
Quigley Co, 56 W 45th St, New York, N. Y.
Adv page 202
Sherwin-Williams Co, Prospect Ave, Cleveland, Ohio
Skybryte Co, Cleveland, Ohio
Socony-Vacuum Oil Co, 26 Broadway, New York, N. Y.
Thurmalox Co, 3109 N Broad St, Philadelphia, Pa.
Adv page 168
Wailes Dove-Hermiston Corp, Westfield, N. J.
White Co, 3200 E Biddle St, Baltimore, Md.

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Socony-Vacuum Oil Co, 26 Broadway, New York, N. Y.
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Cheesman-Elliot Co, 647 Kent Ave, Brooklyn, N. Y.
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Quigley Co, Inc, 56 W 45th St, New York, N. Y.
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Thurmalox Co, 3109 N Broad St, Philadelphia, Pa.
Adv page 168
Tropical Paint & Oil Co, Cleveland, Ohio
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PAINT, INDUSTRIAL

American-Marietta Co, 43 E Ohio St, Chicago, Ill.
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Barrett Co, 40 Rector St, New York, N. Y.
Dampney Co of America, 1243 River St, Hyde Park, Mass.
Dixon, Joseph, Crucible Co, 170 Wayne St, Jersey City, N. J.
Adv page 238
Goodrich, B F, Co, 460 S Main St, Akron, Ohio
Keystone Varnish Co, 71 Otsego St, Brooklyn, N. Y.
Koppers Co, Pittsburgh, Pa.
National Lead Co, 111 Broadway, New York, N. Y.
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Adv page 202
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Spray Engrg Co, 111 Central St, Somerville, Mass.

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Adv pages 36-37
Keasbey & Mattison Co, Butler Pike, Ambler, Pa.
Adv page 150
National Lead Co, 111 Broadway, New York, N. Y.
Pfaudler Co, Rochester, N. Y.
Shaw, Benjamin F, Co, 509 E 2nd St, Wilmington, Del.
Adv page 199
U. S. Stoneware Co, 62 E 42nd St, New York, N. Y.

PIPE, BRASS AND COPPER

American Brass Co, Waterbury, Conn.
Adv page 115
Chase Brass & Copper Co, Waterbury, Conn.
Crane Co, 836 S Michigan Ave, Chicago, Ill.
Adv page 113
Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 24-25
Mueller Brass Co, 1925 A Lapeer Ave, Port Huron, Mich.
Phelps Dodge Copper Products Corp, 40 Wall St, New York, N. Y.
Revere Copper & Brass Inc, 230 Park Ave, New York, N. Y.
Adv page 103
Scovill Mfg Co, Waterbury, Conn.
Shaw, Benjamin F, Co, 509 E 2nd St, Wilmington, Del.
Adv page 199
Wolverine Tube Co, Detroit, Mich.

PIPE, CAST-IRON

American Cast Iron Pipe Co, Birmingham, Ala.
Barco Mfg Co, 1802½ Winnemac Ave, Chicago, Ill.
Clow, James B & Sons, 201-299 N Talman Ave, Chicago, Ill.
Crane Co, 836 S Michigan Ave, Chicago, Ill.
Adv page 115
National Tube Co, Pittsburgh, Pa.
U. S. Pipe & Foundry Co, Burlington, N. J.
Walworth Co, Inc, 60 E 42nd St, New York, N. Y.
Adv page 237
Warren Foundry & Pipe Corp, 11 Broadway, New York, N. Y.
Wood, R D, & Co, Chestnut St, Philadelphia, Pa.

PIPE CLAMPS

(See Clamps, Pipe)

PIPE COILS

(See Pipe, Tubing)

PIPE, HARD-RUBBER

American Hard Rubber Co, 11 Mercer St, New York, N. Y.
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U. S. Rubber Co, 1230 6th Ave, New York, N. Y.

PIPE-JOINT COMPOUND

(See Compound, Pipe-Joint)

PIPE, SPIRAL-RIVETED, WELDED

American Rolling Mill Co, 7000 Curtis St, Middletown, Ohio
Connery Construction Co, 2nd & Luzerne Sts, Phila, Pa.
Adv page 165
Graver Tank & Mfg Co, Inc, East Chicago, Ind.
Shaw, Benjamin F, Co, 509 E 2nd St, Wilmington, Del.
Adv page 199
Taylor Forge & Pipe Works, Box 485, Chicago, Ill.
Treadwell Construction Co, Midland, Pa.
Young & Bertke Co, 1040 W Hulbert Ave, Cincinnati, Ohio

PIPE, STEEL

Allegheny Ludlum Steel Corp, Pittsburgh, Pa.
American Rolling Mill Co, Middletown, Ohio
Bethlehem Steel Co, Bethlehem, Pa.
Byers, A M, Co, Pittsburgh, Pa.
Adv page 54
Chicago Bridge & Iron Co, 2454 McCormick Bldg, Chicago, Ill.
Cohoes Rolling Mill Co, Cohoes, N. Y.
Crane Co, 836 S Michigan Ave, Chicago, Ill.
Adv page 113
Globe Steel Tubes Co, 4051 W Burnham St, Milwaukee, Wis.
National Tube Co, Pittsburgh, Pa.
Petroleum Iron Works, Sharon, Pa.
Pittsburgh Des Moines Steel Co, Neville Island, Pittsburgh, Pa.
Shaw, Benjamin F, Co, 509 E 2nd St, Wilmington, Del.
Adv page 199
South Chester Tube Co, Chester, Pa.
Steel & Tubes Div, Republic Steel Corp, 218 E 131st St, Cleveland, Ohio
Adv page 149
Wheeling Steel Corp, Wheeling, W. Va.
Willamette Iron & Steel Corp, Portland, Ore.
Youngstown Sheet & Tube Co, Youngstown, Ohio
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PIPE, WOOD

National Tank & Pipe Co, Portland, Ore.
Pacific Tank & Pipe Co, Oakland, Calif.
Wyckoff Pipe & Creosoting Co, 522 Fifth Ave, New York, N. Y.

PIPE, WROUGHT-IRON

Byers, A M, Co, Pittsburgh, Pa.
Adv page 54
Cohoes Rolling Mills, Cohoes, N. Y.
Shaw, Benjamin F, Co, 509 E 2nd St, Wilmington, Del.
Adv page 199
South Chester Tube Co, South Chester, Pa.
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PIPE-BENDING MACHINES

American Pipe Bending Machine Co, 37 Pearl St, Boston, Mass.
Watson-Stillman Co, Roselle, N. J.
Adv page 126

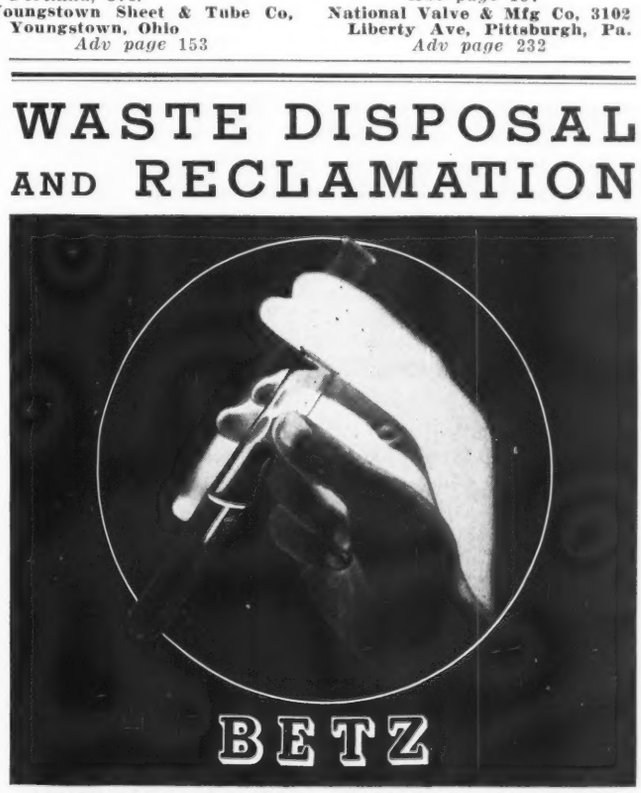
PIPE-THREADING MACHINES

(See Cutting & Threading Machines)

PIPING SYSTEMS, FABRICATED, WELDED

Alco Products Div, 36 Church St, New York, N. Y.
American Rolling Mill Co, Middletown, Ohio
Grinnell Co, Inc, 277 W Exchange St, Providence, R. I.
Adv page 119
Kellogg, M W, Jersey City, N. J.
Adv page 48
Limbert, Geo, B, & Co, 570 Fulton St, Chicago, Ill.
Midwest Piping & Supply Co, 1450 S 2nd St, St Louis, Mo.
Adv page 137
National Valve & Mfg Co, 3102 Liberty Ave, Pittsburgh, Pa.
Adv page 232

WASTE DISPOSAL AND RECLAMATION



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Adv page 131
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Adv page 199
Treadwell, M H, Co, 140 Cedar St, New York, N. Y.
Underground Steam Construction Co, 75 Pitts St, Boston, Mass.

PISTON RINGS

(See Rings, Piston)

PITOT TUBES

(See Tubes, Pitot)

PLANIMETERS

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Trill Indicator Co, 38 E. South St, Corry, Pa.

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American Abrasive Metals Co, Irvington, N. J.
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Crane Co, 836 S Michigan Ave, Chicago, Ill.
Adv page 113
Detroit Lubricator Co, Trumbull Ave, Detroit, Mich.
General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
Lunkenheimer Co, Box 360, Annex Station, Cincinnati, O.
Adv pages 14-15
Nathan Mfg Co, 250 Park Ave, New York, N. Y.
Plouff Co, 1150 Columbus Ave, Boston, Mass.
Rockwood Sprinkler Co, 54 Harlow St, Worcester, Mass.
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Standard Valve Mfg Co, Albany St, Boston, Mass.
Victoria Metal Co, Erie, Pa.

PNEUMATIC CONVEYORS

(See Conveying Systems, Pneumatic)

PORTABLE CONVEYORS

(See Conveyors, Portable)

PRECIPITATORS, DUST, ELECTROSTATIC

Research Corp, 405 Lexington Ave, New York, N. Y.
Western Precipitation Co, 1016 W 9th St, Los Angeles, Calif.
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53

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Adv page 198

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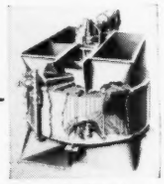

Type CGZX Ljungstrom Air Preheater for Vertical Flow of gas and air.

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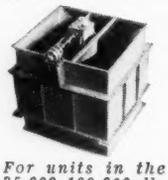

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Adv pages 42-43
Combustion Equipment Co, 1820 Cherry St, Kansas City, Mo.
Edge Moor Iron Works, Inc, 30 Rockefeller Plaza, New York, N. Y.
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Adv page 187
Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 24-25
Green Fuel Economizer Co, 627 Main St, Beacon, N. Y.
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Keeler, E, Co, Williamsport, Pa.
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Adv pages 169, 207
Riley Stoker Corp, 999 Neponset St, Worcester, Mass.
Adv pages 88-89
Schubert-Christy Corp, 1600 Georgia St, Affton Station, St Louis, Mo.
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Surface Combustion Corp, Sieloff St, Toledo, Ohio
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Ozalid Products Div, Johnson City, N. Y.

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Brown Instrument Co, 4490 Wayne Ave, Philadelphia, Pa.
Adv pages 141, 182, 190, 202, 211
Foxboro Co, 38 Neponset Ave, Foxboro, Mass.
Adv page 156
Friez, Julien P, & Sons, 4 N Central Ave, Baltimore, Md.
Johnson Service Corp, 509 E Michigan St, Milwaukee, Wis.
Palmer Co, 2501-A Norwood Ave, Norwood, Cincinnati, Ohio

PULLEYS, TRANSMISSION

American Pulley Co, 4200 Wissahickon Ave, Philadelphia, Pa.
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Dick, R & J, Co, Colfax Ave, Passaic, N. J.
Dodge Mfg Corp, Mishawaka, Ind.
Jones, W A, Foundry & Machine Co, 4423 W Roosevelt Rd, Chicago, Ill.
Link-Belt Co, 300 W Pershing Rd, Chicago, Ill.
Adv page 3
Medart Co, 3548 DeKalb St, St. Louis, Mo.
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Wood's, T B, Sons Co, 1165 5th Ave, Chambersburg, Pa.

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Adv pages 42-43
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Adv pages 24-25
Hardinge Co, Inc, 240 Arch St, York, Pa.
Jeffrey Mfg Co, 932-99 N 4th St, Columbus, Ohio.
Kennedy-Van Saun Mfg & Engrg Corp, 2 Park Ave, New York, N. Y.
Riley Stoker Corp, 999 Neponset St, Worcester, Mass.
Adv pages 88-89
Strong-Scott Mfg Co, N W Terminal, Minneapolis, Minn
Whiting Corp, 15657 Lathrop Ave, Harvey, Ill.

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Anthony Co, 47-33 5th St, Long Island City, N. Y.
Blackmer Pump Co, 2200 Century Ave, Grand Rapids, Mich.
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Dean Brothers Co, Indianapolis, Ind.
De Laval Steam Turbine Co, Trenton, N. J.
Adv pages 50, 201
Eddington Metal Specialty Co, Box K, Eddington, Pa.
Adv pages 193, 201
Engineer Co, 75 West St, New York, N. Y.
Goulds Pumps, Inc, 301 Fall St, Seneca Falls, N. Y.
Granberg Equipment, Inc, 1308 67th St, Oakland, Calif.
Ingersoll-Rand Co, 11 Broadway, New York, N. Y.
Adv pages 38-39
Kinney Mfg Co, 3529 Washington St, Boston, Mass.
Kraissl Co, Inc, Hackensack, N. J.
Leahy Mfg Co, E 8th St, Los Angeles, Calif.
McGowan, John H, Co, Cincinnati, Ohio
Monarch Mfg Works, 2731 E Westmoreland St, Phila, Pa.
National Airoil Burner Co, 1284 E Sedgley Ave, Philadelphia, Pa.
Quimby Pump Co, Inc, 347 Thomas St, Newark, N. J.
Roper, Geo D, Corp, Dept PD, Rockford, Ill.
Schutte & Koerting Co, 12th & Thompson Sts, Phila, Pa.
Staples & Pfeiffer, Ltd, San Francisco, Calif.
Tuthill Pump Co, 939 E 95th St, Chicago, Ill.
Viking Pump Co, 404 Decwer St, Cedar Falls, Iowa
Adv page 134
Worthington Pump & Machinery Corp, Harrison, N. J.

PUMP GOVERNORS

(See Governors, Pump)

PUMP VALVES

(See Valves, Pump)

PUMPS, CENTRIFUGAL

Aldrich Pump Co, Allentown, Pa.
Allen-Sherman-Hoff Co, 227 S 15th St, Philadelphia, Pa.
Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
American Manganese Steel Co, 397 E 14th St, Chicago Heights, Ill.
American Marsh Pumps, 60 Capitol Ave N E, Battle Creek, Mich.
American Well Works, 100 N Broadway, Aurora, Ill.
Aurora Pump Co, 615 Loucks St, Aurora, Ill.
Barrett, Haentjens & Co, Hazleton, Pa.
Beach-Russ Co, 50 Church St, New York, N. Y.
Black-Clawson Co, Hamilton, O.
Boyts, Porter & Co, Connellsville, Pa.
Buffalo Pumps, Inc, 488 Broadway, Buffalo, N. Y.
Byron Jackson Co, P O Box 2017 Terminal Annex, Los Angeles, Calif.
Chicago Pump Co, 2336 Wolfram St, Chicago, Ill.
Coffin, J S, Jr, Co, Englewood, N. J.
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Dean Hill Pump Co, Anderson, Ind.
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Adv pages 50, 201
Deming Co, 500 Broadway, Salem, Ohio.
Adv page 200
Domestic Engine & Pump Co, Shippensburg, Pa.
Dunham, C A, Co, 450 E Ohio St, Chicago, Ill.
Dudgeon, Richard, Inc, 24 Columbia St, New York, N. Y.
Duriron Co, Inc, Dayton, Ohio
Economy Pumps, Inc, Hamilton, O.
Fairbanks, Morse & Co, 600 S Michigan Avenue, Chicago, Ill.
Foster Pump Works, Inc, 50 Washington St, Brooklyn, N. Y.
Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 24-25
Frederick Iron & Steel Co, Frederick, Md.
Gardner-Denver Co, 100 Gardner Drive, Quincy, Ill.
Goulds Pumps, Inc, 301 Fall St, Seneca Falls, N. Y.
Goyne Steam Pump Co, Ashland, Pa.
Ingersoll-Rand Co, 11 Broadway, New York, N. Y.
Adv pages 38-39
Kimball Krogh Pump Corp, 301 West Ave 26, Los Angeles, Calif.
Kraissl Co, Hackensack, N. J.
Lawrence Pump & Engine Co, Lawrence, Mass.
Lecourtenay Co, 5 Maine St, Newark, N. J.
Lewis, Chas S, & Co, Pine St at 22nd, St Louis, Mo.
McGowan, John H, Co, Cincinnati, Ohio
Manistee Iron Works Co, Manistee. Mich.
Micro-Westco, Inc, 104 State St. Bettendorf, Iowa
Morris Machine Works, 100 E Genesee St, Baldwinsville, N. Y.
Nash Engrg Co, S Norwalk, Ct.
Oliver United Filters, Inc, Oakland, Calif.
Pacific Pump Works, 5715 Bicket St, Huntington Park, Cal.
Adv page 139
Pennsylvania Pump & Compressor Co, Easton, Pa.
Quimby Pump Co, Inc, 347 Thomas St, Newark, N. J.
Scranton Pump Mfg Co, Scranton, Pa.
Sterling Pump Corp, South Bend. Ind.
Taber Pump Co, 286 Elm St, Buffalo, N. Y.
Union Steam Pump Co, Battle Creek, Mich.
Warren Steam Pump Co, 1234 Bridges Ave, Warren, Mass.
Adv page 243
Well Pump Co, 215-17 W Superior St, Chicago, Ill.
Weinman Pump Co, Columbus, O.
Wilson Snyder Mfg Corp, Pittsburgh, Pa.
Worthington Pump & Machinery Corp, Harrison, N. J.
Yeomans Bros Co, 1446 Dayton St, Chicago, Ill.
Yuba Mfg Co, San Francisco, Calif.

PUMPS, DEEPWELL

American Marsh Pumps, 60 Capitol Ave, N E, Battle Creek, Mich.
American Well Works, 100 N Broadway, Aurora, Ill.
Aurora Pump Co, 615 Loucks St, Aurora, Ill.
Byron Jackson Co, P O Box 2017 Terminal Annex, Los Angeles, Calif.
Columbus Steam Pump Works Co, Columbus, Ohio
Cook, A D, Inc, Lawrenceburg, Ind.
Davidson, M T, Co, 154 Nassau St, New York, N. Y.
Deming Co, 500 Broadway, Salem, Ohio
Adv page 200
Fairbanks, Morse & Co, 600 S Michigan Ave, Chicago, Ill.
Goulds Pumps, Inc, 301 Fall St, Seneca Falls, N. Y.
Jarecki Mfg Co, Erie, Pa.
Adv page 242
Kimball-Krogh Pump Co, 326 West Ave 26, Los Angeles, Calif.
Layne & Bowler, Inc, Memphis, Tenn.
McGowan, John H, Co, Cincinnati, Ohio
Micro-Westco, Inc, 104 State St, Bettendorf, Iowa.
Morris Machine Works, 100 E Genesee St, Baldwinsville, N. Y.
Pacific Pump Works, 5715 Bicket St, Huntington Park, Calif.
Adv page 139
Peerless Pump Division, 305 West Ave 26, Los Angeles, Calif.
Pomona Pump Co, 206 E Commercial St, Pomona, Calif.
Roper, Geo D, Corp, Dept P D, Blackhawk Park Ave, Rockford, Ill.
Sterling Pump Corp, South Bend, Ind.
Worthington Pump & Machinery Corp, Harrison, N. J.

PUMPS, PROPORTIONING

Proportioneers, Inc, 7 Codding St, Providence, R. I.
Roy, Milton, Pump Co, 1305 E Mermaid Ave, Chestnut Hill, Philadelphia, Pa.

PUMPS, RECIPROCATING

Aldrich Pump Co, Allentown, Pa.
Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
American Marsh Pumps, 60 Capitol, Battle Creek, Mich.
Buffalo Pumps, Inc, 488 Broadway, Buffalo, N. Y.
Columbus Steam Pump Works Co, Columbus, Ohio
Cook, A D, Inc, Lawrenceburg, Ind.
Davidson, M T, Co, 154 Nassau St, New York, N. Y.
Dean Brothers Co, Indianapolis, Ind.
Deming Co, 500 Broadway, Salem, Ohio
Adv page 200
Fairbanks, Morse & Co, 600 S Michigan Ave, Chicago, Ill.
Foster Pump Works, 50 Washington St, Brooklyn, N. Y.
Gardner-Denver Co, 100 Gardner Drive, Quincy, Ill.
Gaso Pump & Burner Mfg, Co, Tulsa, Okla.
Goulds Pumps, Inc, 301 Falls St, Seneca Falls, N. Y.
Ingersoll-Rand Co, 11 Broadway, New York, N. Y.
Adv pages 38-39
Kraissl Co, Hackensack, N. J.
McGowan, John H, Co, Cincinnati, Ohio
National Steam Pump Co, Upper Sandusky, Ohio
Robertson, John, Co, 133 Water St, Brooklyn, N. Y.
Roper, Geo D, Corp, Dept PD, Blackhawk Park Ave, Rockford, Ill.
Scranton Pump Mfg Co, Scranton, Pa.
Union Steam Pump Co, Battle Creek, Mich.
Wagener Steam Pump Co, Canton, Ohio
Warren Steam Pump Co, 1234 Bridges Ave, Warren, Mass.
Adv page 243
Watson-Stillman Co, Roselle, N. J.
Adv page 126
Wilson Snyder Mfg Corp, Pittsburgh, Pa.
Worthington Pump & Machinery Corp, Harrison, N. J.

PUMPS, ROTARY

Blackmer Pump Co, 2200 Century Ave, Grand Rapids, Mich.
De Laval Steam Turbine Co, Trenton, N. J.
Adv pages 50, 201
Eddington Metal Specialty Co, Box K, Eddington, Pa.
Adv pages 193, 201
Fairbanks, Morse & Co, 600 S Michigan Ave, Chicago, Ill.
Foster Pump Works, 50 Washington St, Brooklyn, N. Y.
Goulds Pumps, Inc, 301 Falls St, Seneca Falls, N. Y.

Granberg Equipment Inc, 1308 67th St, Oakland, Calif.
Kinney Mfg Co, 3529 Washington St, Boston, Mass.
Kraissl Co, Hackensack, N. J.
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Oilgear Co, 1421 W Bruce St, Milwaukee, Wis.
Quimby Pump Co, Inc, 347 Thomas St, Newark, N. J.
Roper, Geo D, Corp, Dept PD, Blackhawk Park Ave, Rockford, Ill.
Schutte & Koerting Co, 12th & Thompson Sts, Phila, Pa.
Taber Pump Co, 286 Elm St, Buffalo, N. Y.
Tuthill Pump Co, 939 E 95th St, Chicago, Ill.
Viking Pump Co, 404 Decwer St, Cedar Falls, Iowa
Adv page 134
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PUMPS, SUMP

American Marsh Pumps, 60 Capitol Ave, Battle Creek, Mich.
Aurora Pump Co, 615 Loucks St, Aurora, Ill.
Buffalo Pumps, Inc, 488 Broadway, Buffalo, N. Y.
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Chicago Pneumatic Tool Co, 6-8 E 44th St, New York, N. Y.
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Dayton Pump & Mfg Co, Dayton, Ohio
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Dean Hill Pump Co, Anderson, Ind.
De Laval Steam Turbine Co, Trenton, N. J.
Adv pages 50, 201
Deming Co, 500 Broadway, Salem, Ohio.
Adv page 200
Economy Pumps, Inc, Hamilton, O.
Fairbanks, Morse & Co, 600 S Michigan Ave, Chicago, Ill.
Frederick Iron & Steel Co, Frederick, Md.
Goulds Pumps, Inc, 301 Fall St, Seneca Falls, N. Y.
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Ingersoll-Rand Co, 11 Broadway, New York, N. Y.
Adv pages 38-39
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Lawrence Pump & Engine Co, Lawrence, Mass.
McGowan, John H, Co, Cincinnati, Ohio.
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PUMPS, VACUUM

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Adv pages 11, 18-19, 107, 256
American Marsh Pumps, 60 Capitol Ave, Battle Creek, Mich.
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Chicago Pump Co, 2336 Wolfram St, Chicago, Ill.
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Adv page 177
Davidson, M T, Co, 154 Nassau St, New York, N. Y.
Dean Brothers Co, Indianapolis, Ind.
Devine, J P, Mfg Co, Mt Vernon, Ill.
Dunham, C A, Co, 450 E Ohio St, Chicago, Ill.
Foster Pump Works, Inc, 50 Washington St, Brooklyn, N. Y.
Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 24-25
Fuller Co, 111 Bridge St, Catasauqua, Pa.
Adv page 130
Gardner-Denver Co, 100 Gardner Drive, Quincy, Ill.
Gaso Pump & Burner Mfg Co, Tulsa, Okla.
Goulds Pumps, Inc, 301 Fall St, Seneca Falls, N. Y.
Goyne Steam Pump Co, Ashland, Pa.
Hoffman Specialty Co, Inc, Waterbury, Conn.
Ingersoll-Rand Co, 11 Broadway, New York, N. Y.
Adv pages 38-39
Kinney Mfg Co, 3529 Washington St, Boston, Mass.
Kraissl Co, Hackensack, N. J.
McGowan, John H, Co, Cincinnati, Ohio
Micro-Westco, Inc, 104 State St, Bettendorf, Iowa
Nash Engrg Co, S Norwalk, Conn.
Oliver United Filters, Inc, Oakland, Calif.
Pennsylvania Pump & Compressor Co, Easton, Pa.
Roots-Connersville Blower Corp, Connersville, Ind.
Schutte & Koerting Co, 12th & Thompson Sts, Phila, Pa.
Stokes, F J, Machine Co, Olney P O, Philadelphia, Pa.

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not

"Reciprocating Pumps"

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Wagener Steam Pump Co, Canton, Ohio.
Warren Steam Pump Co, 1234 Bridges Ave, Warren, Mass.
Adv page 243
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53
Whittington, W P, & Co, Indianapolis, Ind.
Worthington Pump & Machinery Corp, Harrison, N. J.
Yeomans Bros Co, 1446 Dayton St, Chicago, Ill.

PURIFIERS, GAS

American Solvent Recovery Corp, Columbus, Ohio
Centrifix Corp, Dept P, 3029 Prospect Ave, Cleveland, O.
Adv page 206
International Filter Co, 325 W 25th Place, Chicago, Ill.
Isbell-Porter Co, Newark, N. J.
Koppers Co, Pittsburgh, Pa.

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Hilliard Corp, 4 W 4th St, Elmira, N. Y.
Sharples Corp, Phila, Pa.
Skinner Purifiers Inc, 2231 Dalzelle St, Detroit, Mich.

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American Water Softener Co, 4th & Lehigh Sts, Phila, Pa.
Cochrane Corp, 3106 N 17th St, Philadelphia, Pa.
Adv pages 186, 192, 206, 214
Elgin Softener Corp, 55 North St, Elgin, Ill.
Filtrators Co, Inc, 96 Liberty St, New York, N. Y.
Graver Tank & Mfg Co, Inc, East Chicago, Ind.
Griscom-Russell Co, 285 Madison Ave, New York, N. Y.
International Filter Co, 325 W 25th Place, Chicago, Ill.
Mohawk Water Treatment Co, Cleveland, Ohio
National Aluminate Corp, 6222 W 66th Place, Chicago, Ill.
Adv page 105
Permutit Co, Dept A, 330 W 42nd St, New York, N. Y.
Adv page 138
Scaife, Wm B, & Sons Co, River & Ann St, Oakmont, Pa.
Wright-Austin Co, Detroit, Mich.

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Bacharach Industrial Inst Co, 7000 Bennett, Pittsburgh, Pa.
Adv pages 183, 188
Bailey Meter Co, 1036 Ivanhoe Rd, Cleveland, Ohio
Adv page 173
Bristol Co, Waterbury, Conn.
Brown Instrument Co, 4490 Wayne Ave, Philadelphia, Pa.
Adv pages 141, 182, 190, 202, 211
Englehard, Charles, Inc, 234 NJRR Ave, Newark, N. J.
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Adv page 156
Leeds & Northrup Co, 4970 Stenton Ave, Philadelphia, Pa.
Adv page 2nd cover

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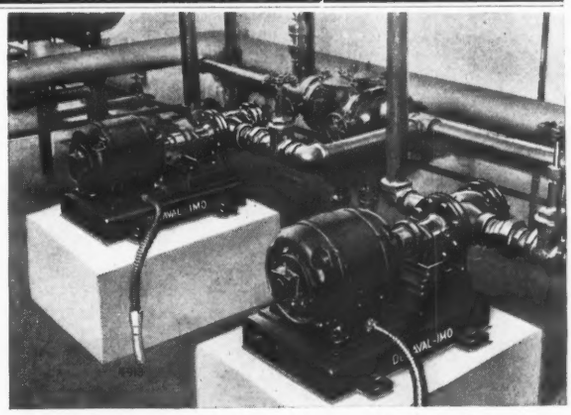

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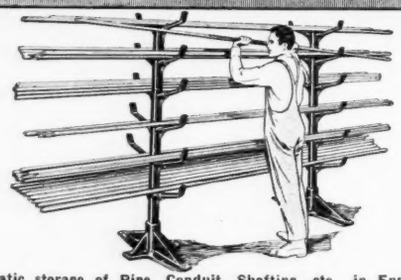

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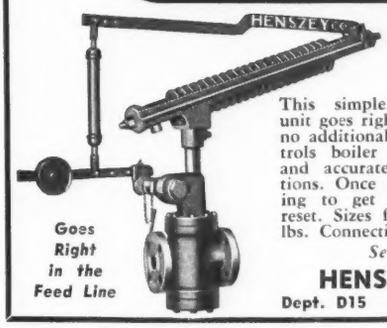

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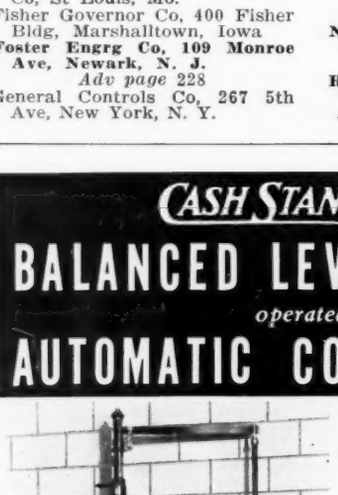

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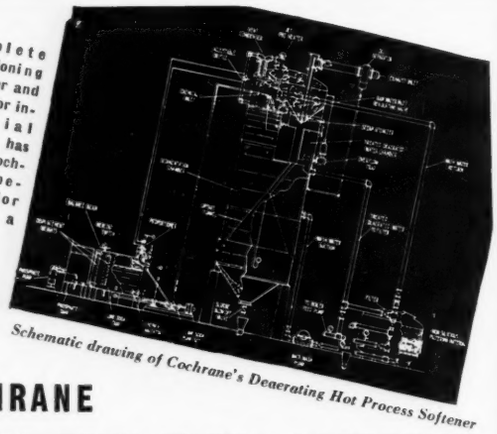

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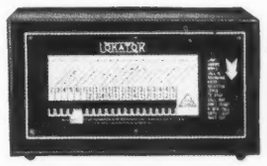

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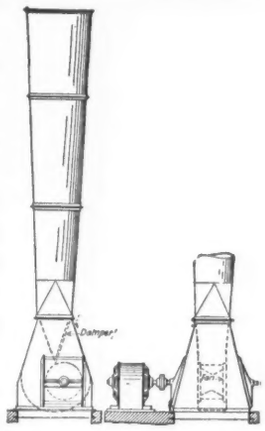

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Adv pages 169-207
Quaker City Iron Works, Philadelphia, Pa.
Richmond Engrg Co, 7th & Hospital Sts, Richmond, Va.
Steacy-Schmidt Mfg, York, Pa.
Stearns-Roger Mfg Co, Denver, Colo.
Stover Steel Tank & Mfg Co, Freeport, Ill.
Titusville Iron Works Co, Titusville, Pa.
Treadwell, M H, Co, 140 Cedar St, New York, N. Y.
Union Boiler & Mfg Co, Lebanon, Pa.
Union Iron Works, Erie, Pa.
Wickes Boiler Co, 502 N Water St Saginaw, Mich.
Youngstown Steel Tank Co, Youngstown, Ohio

STEAM-JET CONVEYORS

(See Conveyors, Pneumatic, Steam-Jet)

STOKERS, OVERFEED

Canton Stoker Corp, 741 Andrew Place, Canton, O.
Adv page 208
Detroit Stoker Co, General Motors Bldg, Detroit, Mich.
Adv page 209
Flynn & Emrich Co, 300 Holliday St, Baltimore, Md.
Hoffman Combustion Engrg Co, 709 Marquette Bldg, Detroit, Mich.
Perfection Grate & Stoker Co, Springfield, Mass.
Whiting Corp, 15657 Lathrop Ave, Harvey, Ill.

STOKERS, SPREADER

American Coal Burner Co, E Superior St, Chicago, Ill.
Adv page 47
Detroit Stoker Co, General Motors Bldg, Detroit, Mich.
Adv page 209
Hoffman Combustion Engrg Co, Marquette Bldg, Detroit, Mich.
Iron Fireman Mfg Co, 3295 W 106th St, Cleveland, Ohio
Adv page 129
Whiting Corp, 15657 Lathrop Ave, Harvey, Ill.

STOKERS, TRAVELING-GRATE

Babcock & Wilcox Co, 85 Liberty St, New York, N. Y.
Adv pages 4-5
Combustion Engrg Co, Inc, 206 Madison Ave, New York, N. Y.
Adv pages 42-43
Illinois Stoker Co, Alton, Ill.
Johnston & Jennings Co, 878 Addison Rd, Cleveland, Ohio
Adv page 31
Laclede Stoker Co, 4440 Hunt Ave, St Louis, Mo.
McClave Co, Allentown, Pa.
Riley Stoker Corp, 999 Neponset St, Worcester, Mass.
Adv pages 88-89

STOKERS, UNDERFEED, MULTIPLE-RETORT

American Engrg Co, Aramingo Ave, Philadelphia, Pa.
Adv pages 12-13
Combustion Engrg Co, Inc. 206 Madison Ave, New York, N. Y.
Adv pages 42-43
Detroit Stoker Co, General Motors Bldg, Detroit, Mich.
Adv page 209
Hoffman Combustion Engrg Co, Marquette Bldg, Detroit, Mich.
Riley Stoker Corp, 999 Neponset St, Worcester, Mass.
Adv pages 88-89
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53

STOKERS, UNDERFEED, SINGLE-RETORT

Bros, Wm, Boiler & Mfg Co, Nicollet Island, Minneapolis, Minn.
Brownell Co, 301 N Findlay St, Dayton, Ohio
Canton Stoker Corp, 741 Andrew Place, Canton, Ohio
Adv page 208
Combustioneer Div, Steel Products Engrg Corp, Springfield, Ohio.
Combustion Engrg Co, Inc, 206 Madison Ave, New York, N. Y.
Adv pages 42-43
Conco Engrg Works, Mendota, Ill.
Detroit Stoker Co, General Motors Bldg, Detroit, Mich.
Adv page 209
Fairbanks, Morse & Co, 600 S Michigan Ave, Chicago, Ill.
Flynn & Emrich Co, 300 Holliday St, Baltimore, Md.
Frederick Iron & Steel Co, Frederick, Md.
Hoffman Combustion Engrg Co, Marquette Bldg, Detroit, Mich.
Iron Fireman Mfg Co, 3295 W 106th St, Cleveland, Ohio
Adv page 129
Link-Belt Co, 2410 W 18th St, Chicago, Ill.
Adv page 3
Perfection Grate & Stoker Co, Springfield, Mass.
Riley Stoker Corp, 999 Neponset St, Worcester, Mass.
Adv pages 88-89
U. S. Machine Corp, Lebanon, Ind.
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53

STORAGE SYSTEMS, COAL

Bartlett & Snow, C O, Co, Cleveland, Ohio.
Adv page 151
Brady Conveyors Corp, 20 W Jackson Blvd, Chicago, Ill.
Chain Belt Co, 1674 W Bruce St, Milwaukee, Wis.
Gifford-Wood Co, 24 Hill St, Hudson, N. Y.
Hahn Engrg Co, 30 Church St, New York, N. Y.
Adv page 172
Jeffrey Mfg Co, 932-99 N 4th St, Columbus, Ohio
Lidgerwood Mfg Co, Elizabeth, N. J.
Link-Belt Co, 300 W Pershing Rd, Chicago, Ill.
Adv page 3
Sauerman Bros, Inc, 462 S Clinton St, Chicago, Ill.
Stephens-Adamson Mfg Co, 5 Ridgeway Ave, Aurora, Ill.
United Conveyor Corp, Dearborn & Van Buren Sts, Chicago, Ill.

STRAINERS, GAS, AIR

Aero Supply Mfg Co, Corry, Pa.
Andale Co, 1600 Arch St, Philadelphia, Pa.
Blackmer Pump Co, 2200 Century Ave, Grand Rapids, Mich.
Burgess Battery Co, 500 W Huron St, Chicago, Ill.
Cash, A W, Co, 402 N Eldorado St, Decatur, Ill.
Adv pages 172, 204, 216, 222
Cash Universal Regulator Co, Marshalltown, Iowa.
Cuno Engrg Corp, Meriden, Conn.
Davis Regulator Co, 2540 S Washtenaw Ave, Chicago, Ill.
Edward Valve & Mfg Co, 1150 W 145th St, East Chicago, Ind.
Fisher Governor Co, 400 Fisher Bldg, Marshalltown, Iowa.
Kraissl Co, Hackensack, N. J.
Leslie Co, Lyndhurst, N. J.
Mueller Co, Decatur, Ill.
Sarco Co, Inc, 183 Madison Ave, New York, N. Y.
Adv page 215
Staples & Pfeiffer, Ltd, San Francisco, Calif.
Staynew Filter Corp, Rochester, N. Y.
Adv page 241
Tryco Products Inc, 1 Railroad Ave, Westfield, Mass.
Wright-Austin Co, Detroit, Mich.

STRAINERS, OIL

Andale Co, 1600 Arch St, Philadelphia, Pa.
Anderson, V D, 1934 W 96th St, Cleveland, Ohio
Anthony Co, 47-33 5th St, Long Island City, N. Y.
Blackmer Pump Co, 2200 Century Ave, Grand Rapids, Mich.
Buffalo Meter Co, 2887 Main St, Buffalo, N. Y.
Cash, A W, Co, 402 N Eldorado St, Decatur, Ill.
Adv pages 172, 204, 216, 222
Cash Universal Regulator Co, Marshalltown, Iowa.
Chicago Flexible Shaft Co, Roosevelt Rd, Chicago, Ill.
Coen Co, 40 Boardman Place, San Francisco, Calif.
Cuno Engrg Corp, Meriden, Conn.
Davis Regular Co, 2540 S Washtenaw Ave, Chicago, Ill.
Edward Valve & Mfg Co, 1150 W 145th St, East Chicago, Ind.
Elliott Co, Jeannette, Pa.
Adv pages 6-7
Fisher Governor Co, 400 Fisher Bldg, Marshalltown, Iowa.
Foster Engrg Co, 109 Monroe St, Newark, N. J.
Adv page 228
Foster Pump Works Inc, 50 Washington St, Brooklyn, N. Y.
Gaso Pump & Burner Mfg Co, Tulsa, Okla.
Kinney Mfg Co, 3529 Washington St, Boston, Mass.
Kraissl Co, Hackensack, N. J.
Leahy Mfg Co, Los Angeles, Cal.
Leslie Co, Lyndhurst, N. J.
Mahr Mfg Co, Minneapolis, Minn.
Mason - Neilan Regulator Co, 1186 Adams St, Boston, Mass.
Monarch Mfg Works, 2731 E Westmoreland St, Phila, Pa.
Mueller Co, Decatur, Ill.
National Airoil Burner Co, 1284 E Sedgley Ave, Phila, Pa.
Newark Wire Cloth Co, 355-369 Verona Ave, Newark, N. J.
Nugent, Wm W, & Co, Inc, 402 N Hermitage Ave, Chicago, Ill.
Sarco Co, Inc, 183 Madison Ave, New York, N. Y.
Adv page 215
Schade Valve Mfg Co, 2527 N Bodine St, Philadelphia, Pa.
Schutte & Koerting Co, 12th & Thompson Sts, Phila, Pa.
Spence Engrg Co, Inc, 61 Grant St, Walden, N. Y.
Adv page 204
Staples & Pfeiffer Ltd, San Francisco, Calif.
Staynew Filter Corp, Rochester, N. Y.
Adv page 241
Wright-Austin Co, Detroit Mich.

STRAINERS, STEAM

American District Steam Co, 70 Bryant St, N Tonawanda, N. Y.
Adv page 242
Andale Co, 1600 Arch St, Philadelphia, Pa.
Anderson, V D, Co, 1934 W 96th St, Cleveland, Ohio
Atwood & Morrill Co, Salem, Mass.
Carling Turbine Blower Co, 25 St. John's Rd, Worcester, Mass.
Cash, A W, Co, 402 N Eldorado Sts, Decatur, Ill.
Adv pages 172, 204, 216, 222
Cash Universal Regulator Co, Marshalltown, Iowa
Cashin, W D, Co, 69 A St, Boston, Mass.
Davis Regulator Co, 2540 S Washtenaw Ave, Chicago, Ill.
Eddington Metal Specialty Co, Box K, Eddington, Pa.
Adv pages 193, 201
Edward Valve & Mfg Co, 1150 W 145th St, East Chicago, Ind.
Fisher Governor Co, 400 Fisher Bldg, Marshalltown, Iowa

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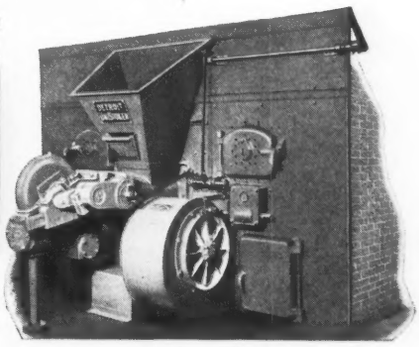
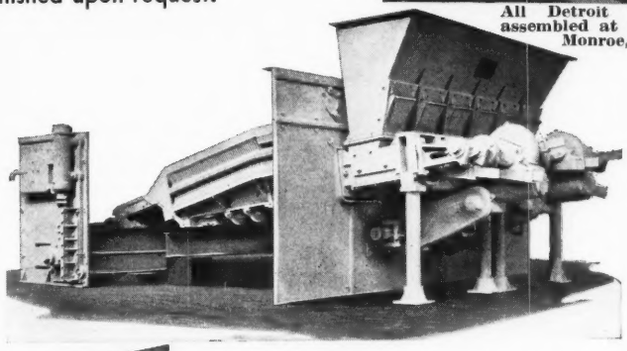
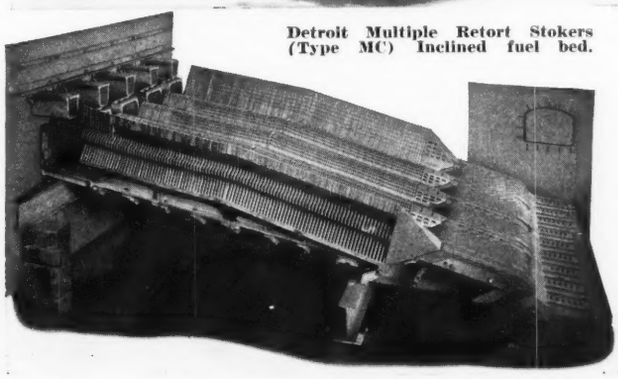


Detroit UniStoker

Self-contained, Single Retort, Motor or Turbine driven, for 125 to 300 horsepower boilers. Furnace widths 5 to 8 feet. Detroit Adjustable Feed provides various rates of coal feed and accurate control of air supply. Write for Bulletin 630.

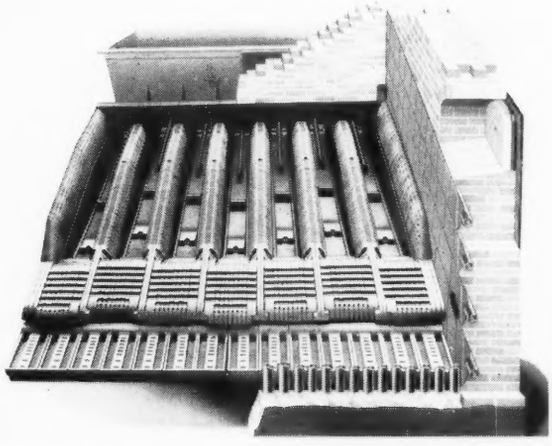


Detroit Multiple Retort Stokers (Type MC) Inclined fuel bed.

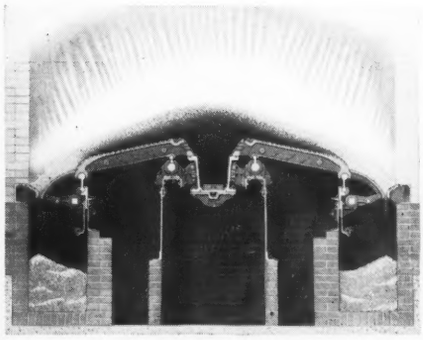


Detroit Multiple Retort Stoker (Type MC)

Deep inclined retorts—Adjustable moving bottoms. Large fuel capacity in reserve to meet variations in load. Independent adjustments of fuel feed and distribution. Extension moving grates—Zoned air control—air preheated if desired. Power or hand dumping mechanisms. Write for Bulletin 130.



Rear view showing retorts—moving extension and dumping grates.



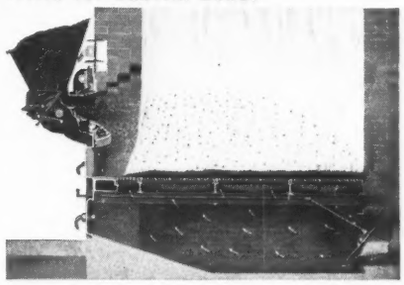
C-D stands for Continuous Discharge of Ashes

Detroit C-D Stoker

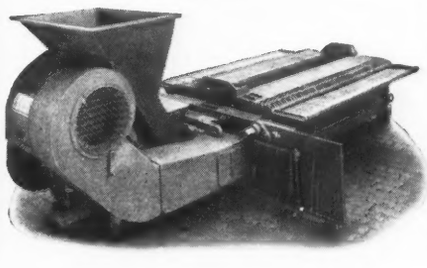
Single Retort—Moving Grate Stoker for boilers 300 to 500 H.P. Furnace widths 7½ to 12 feet. Ash Discharge Sections have a rocking movement. Rate of ash discharge is controlled at the front. Square Ram—Adjustable Moving Retort Bottom. Write for Bulletin 2030.

Detroit RotoStoker

Overfeed Spreader Type with OVER-THROW ROTOR action that assures uniform fuel distribution. Burns all grades of coal or coal with refuse. Responsive to sudden changes in load, with high maintained efficiency. Write for Bulletin 830.



Detroit RotoStoker (stationary grate) (Also built with power or hand operated dumping grates).



Detroit LoStoker

Plunger feed, side cleaning Stoker for heating or small power boilers, 30 to 150 horsepower. Write for Bulletin 330.

Foster Engrg Co, 109 Monroe St, Newark, N. J.
Adv page 228
Goyne Steam Pump Co, Ashland, Pa.
Kieley & Mueller Inc, 40 W 13th St, New York, N. Y.
Leahy Mfg Co, Los Angeles, Cal.
Leslie Co, Lyndhurst, N. J.
Marsh, Jas P, Corp, 2049 Southport Ave, Chicago, Ill.
Mason-Neilan Regulator Co, 1186 Adams St, Boston, Mass.
Mueller Co, Decatur, Ill.
Sarco Co, Inc, 183 Madison Ave, New York, N. Y.
Adv page 215
Schutte & Koerting Co, 12th & Thompson Sts, Phila, Pa.
Spence Engrg Co, Inc, 61 Grant St, Walden, N. Y.
Adv page 204
Staples & Pfeiffer, Ltd, San Francisco, Calif.
Strong, Carlisle & Hammond Co, 1392 W 3rd St, Cleveland, Ohio
Tryco Products, Inc., 1 Railroad Ave, Westfield, Mass.
Wright-Austin Co, Detroit, Mich.

STRAINERS, WATER

American District Steam Co, 70 Bryant St, N Tonawanda, N. Y.
Adv page 242
Andale Co, 1600 Arch St, Philadelphia, Pa.
Anderson, V D, 1934 W 96th St, Cleveland, Ohio.
Anthony Co, 47–33 5th St, Long Island City, N. Y.
Atwood & Morrill Co, Salem, Mass.
Barrett, Haentjens & Co, Hazleton, Pa.
Blackmer Pump Co, 2200 Century Ave, Grand Rapids, Mich.
Buffalo Meter Co, 2887 Main St, Buffalo, N. Y.
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Adv pages 172, 204, 216, 222

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Davis Regulator Co, 2540 S Washtenaw Ave, Chicago, Ill.
Dunham, C A, Co, 450 E Ohio St, Chicago, Ill.
Eddington Metal Specialty Co, Box K, Eddington, Pa.
Adv pages 193, 201
Edward Valve & Mfg Co, 1150 W 145th St, East Chicago, Ind.
Elliott Co, Jeannette, Pa.
Adv pages 6-7
Fisher Governor Co, 400 Fisher Bldg, Marshalltown, Iowa
Foster Engrg Co, 109 Monroe St, Newark, N. J.
Adv page 228
Foster Pump Works, Inc, 50 Washington St, Brooklyn, N. Y.
Kieley & Mueller Inc, 40 W 13th St, New York, N. Y.
Kinney Mfg Co, 3529 Washington St, Boston, Mass.
Kraissl Co, Hackensack, N. J.
Leslie Co, Lyndhurst, N. J.
Marsh, Jas P, Corp, 2049 Southport Ave, Chicago, Ill.
Monarch Mfg Works, 2731 E Westmoreland St, Phila, Pa.
Sarco Co, Inc, 183 Madison Ave, New York, N. Y.
Adv page 215
Schade Valve Mfg Co, 2527 N Bodine St, Philadelphia, Pa.
Schutte & Koerting Co, 12th & Thompson Sts, Phila, Pa.
Spence Engrg Co, Inc, 61 Grant St, Walden, N. Y.
Adv page 204
Spray Engrg Co, 111 Central St. Somerville, Mass.
Staples & Pfeiffer, Ltd, San Francisco, Calif.
Staynew Filter Corp, Rochester, N. Y.
Adv page 241
Strong, Carlisle & Hammond Co, 1392 W 3rd St, Cleveland, O.
Swartwout Co, 18501 Euclid Ave, Cleveland, Ohio
Adv pages 20-21
Trane Co, 2012 Cameron Ave, La Crosse, Wis.
Tryco Products Inc, 1 Railroad Ave, Westfield, Mass.
Wright-Austin Co, Detroit, Mich.

SUPERHEATERS

Babcock & Wilcox Co, 85 Liberty St, New York, N. Y.
Adv pages 4-5
Combustion Engrg Co, Inc, 206 Madison Ave, New York, N. Y.
Adv pages 42-43
Edge Moor Iron Works, 30 Rockefeller Plaza, New York, N. Y.
Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 24-25
Marley Co, Fairfax Rd & Marley Ave, Kansas City, Kan.
Adv page 30
Riley Stoker Corp, 999 Neponset St, Worcester, Mass.
Adv pages 88-89
Superheat Control Corp, 422 Dime Bank Bldg, Detroit, Mich.

SWITCHBOARDS

Adam, Frank, Electric Co, St. Louis, Mo.
Allen-Bradley, Milwaukee, Wis.
Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
Bogue Electric Co, 80 Glover Ave, Paterson, N. J.
Continental Diamond Fibre Co, Newark, Del.
General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
Hanson-Van Winkle - Munning Co, Matewan, N. J.
I-T-E Circuit Breaker Co, 19th & Hamilton Sts, Phila, Pa.
Metropolitan Electric Mfg Co, 22-48 Steinway, Long Island City, N. Y.
Roller-Smith Co, 1766 W Market St, Bethlehem, Pa.
Square D Co, Rivard & Piquette Sts, Detroit, Mich.
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53

SWITCHES, ELECTRIC

(See Also, Breakers, Circuit)
Adam, Frank, Electric Co, St. Louis, Mo.
Allen-Bradley Co, Milwaukee, Wis.
Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
Arrow-Hart & Hegeman Elect Co, 105 Hawthorn, Hartford, Conn.
Automatic Switch Co, 41 E 11th St, New York, N. Y.
Bryant Electric Co, Bridgeport, Conn.
Clark Controller Co, Cleveland, Ohio
Colt's Patent Fire Arms Mfg Co, Hartford, Conn.
Cutler-Hammer, Inc, 606 N 12th St, Milwaukee, Wis.
Adv page 99
G & W Electric Specialty Co, 7780 Dante Ave, Chicago, Ill.
General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
I-T-E Circuit Breaker Co, 19th
Jefferson Electric Co, Bellwood, Ill.
Metropolitan Electric Mfg Co, 22-48 Steinway, Long Island City, N. Y.
Monitor Controller Co, Baltimore, Md.
Pacific Electric Mfg Corp, 5815 3rd St, San Francisco, Calif.
Penn Electric Switch Co, Goshen, Ind.
Railway & Industrial Engrg Co, Greensburg, Pa.
Roller-Smith Co, 1766 West Market St, Bethlehem, Pa.
Schweitzer & Conrad, 4433 N Ravenswood Ave, Chicago, Ill.
Southern States Equipment Corp, Birmingham, Ala.
Square D Co, Rivard & Piquette Sts, Detroit, Mich.
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53
Zenith Electric Co, 845 S Wabash Ave, Chicago, Ill.

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Burlington Instrument Corp, 301 N Main St, Burlington, Iowa
Adv page 172
Electric Machinery Mfg Co, 1331 Tyler St, N E, Minneapolis, Minn.

SYNCHROSCOPES

Burlington Instrument Corp, 301 N Main St, Burlington, Iowa
Adv page 172
General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Roller-Smith Co, 1766 W Market St, Bethlehem, Pa.
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53
Weston Electrical Instrument Corp, 614 Frelinghuysen Ave, Newark, N. J.
Adv pages 163, 210

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Bailey Meter Co, 1036 Ivanhoe Rd, Cleveland, Ohio
Adv page 173
Biddle, Jas G, Co, 1211-13 Arch St, Philadelphia, Pa.
Adv page 211
Bristol Co, Waterbury, Conn.
Brown Instrument Co, 4490 Wayne Ave, Philadelphia, Pa.
Adv pages 141, 182, 190, 202, 211
Coats Machine Tool Co, 110 Washington, New York, N. Y.
Esterline-Angus Co, Box 596, Indianapolis, Ind.
Foxboro Co, 38 Neponset Ave, Foxboro, Mass.
Adv page 156

General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Scherr, George, Co, 126 Lafayette St, New York, N. Y.
Veeder-Root, Inc, Hartford, Conn.
Weston Electrical Instrument Corp, 614 Frelinghuysen Ave, Newark, N. J.
Adv pages 163, 210
Zernickow, O, Co, 21 Park Row, New York, N. Y.

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Brady Conveyors Corp, 20 W Jackson Blvd, Chicago, Ill.
Hahn Engrg Co, 30 Church St, New York, N. Y.
Adv page 172
Meehanite Corp, Dept A, 311 Ross St, Pittsburgh, Pa.
National Conveyors Co, 50 Church St, New York, N. Y.
United Conveyor Corp, Dearborn & Van Buren Sts, Chicago, Ill.

TANKS, ICE

Baker Ice Machine Co, Inc, Omaha, Neb.
Caldwell, W E, Co, Inc, 280 Brandeis St, Louisville, Ky.
Chicago Bridge & Iron Co, 2454 McCormick Bldg, Chicago, Ill.
Downingtown Iron Works, Downingtown, Pa.
Frick Co, 325 Broadway, Waynesboro, Pa.
Adv page 140
Haveg Corp, Newark, Del.
Quaker City Iron Works, Aramingo Ave, Philadelphia, Pa.
Vilter Mfg Co, 2217 S 1st St, Milwaukee, Wis.
Vogt, Henry, Machine Co, 1000 W Ormsby St, Louisville, Ky.
Adv page 217
York Ice Machinery Corp, York, Pa.

TANKS, STEEL

Alco Products Div, 36 Church St, New York, N. Y.
Alpha Tank & Sheet Metal Mfg Co, St Louis, Mo.
American Welding Co, 30 Church St, New York, N. Y.
Babcock & Wilcox Co, 85 Liberty St, New York, N. Y.
Adv pages 4-5
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Bigelow Co, 200-220 River St, New Haven, Conn.
Birchfield Boiler Inc, Tacoma, Wash.
Black, Sivalls & Bryson, Inc, Oklahoma City, Okla.
Blaw-Knox Co, Pittsburgh, Pa.
Bos-Hatten, Inc, Buffalo, N. Y.
Brownell Co, 301 N Findlay St, Dayton, Ohio
Caldwell, W E, Co, Inc, 280 Brandeis St, Louisville, Ky.
Chattanooga Boiler & Tank Co, Box 110, Chattanooga, Tenn.
Chicago Bridge & Iron Co, 2454 McCormick Bldg, Chicago, Ill.
Cochrane Corp, 3106 N 17th St, Philadelphia, Pa.
Adv pages 186, 192, 206, 214
Cole, R D, Mfg Co, Newman, Ga.
Colonial Iron Works Co, 17643 St. Clair Ave, Cleveland, Ohio
Combustion Engrg Co, Inc, 206 Madison Ave, New York, N. Y.
Adv pages 42-43
Connery Construction Co, 2nd & Luzerne Sts, Phila, Pa.
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Devine, J P, Mfg Co, Inc, Mt Vernon, Ill.
Dover Boiler Works, 90 E Dickerson St, Dover, N. J.
Downington Iron Works, Downington, Pa.
Drummond Mfg Co, Louisville, Ky.
Edge Moor Iron Works, 30 Rockefeller Plaza, New York, N. Y.
Farrar & Trefts, Buffalo, N. Y.
Frick Co, Inc, 325 Broadway, Waynesboro, Pa.
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Graver Tank & Mfg Co, Inc, East Chicago, Ill.
Hauser-Stander Tank Co, Cincinnati, Ohio
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Koppers Co, Pittsburgh, Pa.
Littleford Bros, 457 E Pearl St, Cincinnati, Ohio
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Milwaukee Reliance Boiler Works, Milwaukee, Wis.
Munroe, R, & Sons Mfg Corp, 23rd St, Pittsburgh, Pa.
Murray Iron Works Co, Burlington, Iowa
Adv page 46
National Conveyors Co, 50 Church St, New York, N. Y.
Ohio Machine & Boiler Co, Cleveland, Ohio
Pfaudler Co, Rochester, N. Y.
Quaker City Iron Works, Philadelphia, Pa.
Richmond Engrg Co, 7th & Hospital Sts, Richmond, Va.
Scaife, Wm B, & Sons Co, River & Ann St, Oakmont, Pa.
Stearns-Roger Mfg Co, Denver, Colo.
Stover Steel Tank & Mfg Co, Freeport, Ill.
Straight Line Foundry & Machine Co, 218 S Geddes St, Syracuse, N. Y.
Titusville Iron Works Co, Titusville, Pa.
Treadwell, M H, Co, 140 Cedar St, New York, N. Y.
Union Boiler & Mfg Co, Lebanon, Pa.
Union Iron Works, Erie, Pa.
Vogt, Henry, Machine Co, 1000 W Ormsby St, Louisville, Ky.
Adv page 217
Wickes Boiler Co, 502 N Water St, Saginaw, Mich.
Young & Bertke Co, 1040 W Hulbert Ave, Cincinnati, Ohio
Youngstown Steel Tank Co, Youngstown, Ohio

TANKS, WOOD

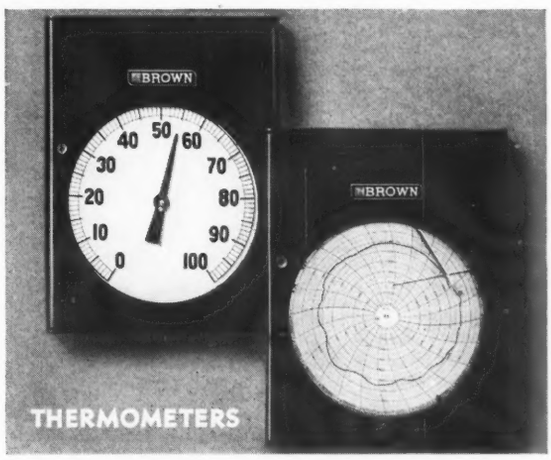
Arrow Tank Co, Inc, Buffalo, N. Y.
Black, Sivalls & Bryson, Inc, Oklahoma City, Okla.
Caldwell, W E, Co, Inc, 280 Brandeis St, Louisville, Ky.
Challenge Co, Batavia, Ill.
Davis, G M, & Son, Palatka, Fla.
Dunck Tank Works Inc, Milwaukee, Wis.
Hauser-Stander Tank Co, Cincinnati, Ohio
Kalamazoo Tank & Silo Co, Kalamazoo, Mich.
National Tank Co, Tulsa, Okla.
National Tank & Pipe Co, Portland, Ore.
New England Tank & Tower Co, Everett, Mass.

THERMOMETERS, GLASS

Bristol Co, Waterbury, Conn.
Johnson Service Co, 509 E Michigan St, Milwaukee, Wis.
Manning, Maxwell & Moore, Inc, Bridgeport, Conn.
Moeller Instrument Co, 132-02 89th Ave, Richmond Hill, N. Y.
Nurnberg Thermometer Co, 401 Bridge St, Brooklyn, N. Y.
Palmer Co, 2501-A Norwood Ave, Cincinnati, Ohio
Tagliabue, C J, Mfg Co, Park & Nostrand Aves, Brooklyn, N. Y.
Taylor Instrument Cos, Rochester, N. Y.
Adv page 235
U. S. Gauge Co, 44 Beaver St, New York, N. Y.
Adv page 182
Wagner, Carl H, & Son, N Albany Ave, Chicago, Ill.

THERMOMETERS, INDICATING, RECORDING

Bailey Meter Co, 1036 Ivanhoe Rd, Cleveland, Ohio
Adv page 173
Bristol Co, Waterbury, Conn.
Brown Instrument Co, 4490 Wayne Ave, Philadelphia, Pa.
Adv pages 141, 182, 190, 202, 311



For Controlling, Recording and Indicating Temperatures from —40 to +1200°F.

A pressure type, remote bulb type thermometer, consisting of instrument, bulb and connecting tubing completely assembled as one unit. Can be furnished with connecting tubing lengths up to 200 feet.

Charts and scales for a wide variety of ranges are available, from a minimum temperature span of 75°F to a maximum span of 1200°F. Corresponding Centigrade scales and charts are also available.

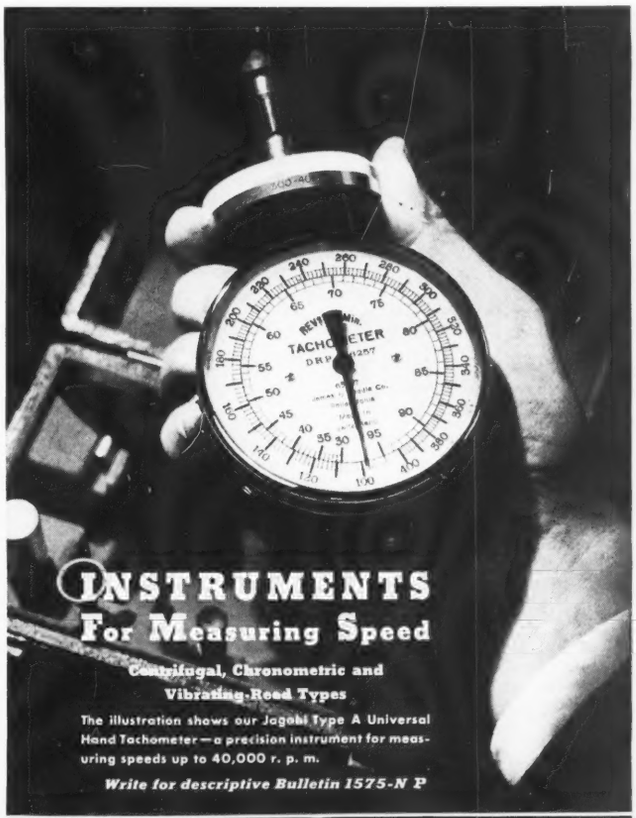
Controllers and recorders furnished in two sizes, one with a 12" diameter chart and the other with a 10" diameter chart. Indicators are equipped with a 7½" eccentric scale. Three kinds of thermal systems are available: vapor-filled, gas-filled, and mercury-filled.

Thermal systems, bulbs, sockets and connecting tubing can be furnished in various styles and material to meet the requirements of each individual job.

Write for Catalog 6706. THE BROWN INSTRUMENT COMPANY, *a division of Minneapolis-Honeywell Regulator Co.*, 4490 Wayne Avenue, Philadelphia, Pa.

BROWN THERMOMETERS AND PRESSURE GAUGES

Accurate Measurement with Simplicity



INSTRUMENTS For Measuring Speed

Centrifugal, Chronometric and Vibrating-Reed Types

The illustration shows our Jagabi Type A Universal Hand Tachometer—a precision instrument for measuring speeds up to 40,000 r. p. m.

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James G. Biddle Co.

ELECTRICAL AND SCIENTIFIC INSTRUMENTS

1211-13 ARCH STREET PHILADELPHIA, PA.

SPEED RANGES UP TO 16 TO 1

RELIANCE V♦S DRIVE

AN ALL-ELECTRIC ADJUSTABLE-SPEED DRIVE FOR A-C. CIRCUITS

SIZES—1 to 30 HP.

1. A DIRECT DRIVE. Fewer parts and less space because the drive is direct—there's no intermediate speed-changing device.

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All Voltages and Cycles

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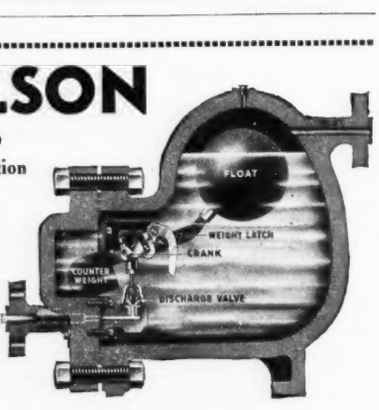
NICHOLSON

Weight-Operated Trap

Automatic Intermittent Action

Model C is designed and built to meet all the requirements of a trap for modern high pressure power plants and refineries. It is especially recommended for draining Headers, Line Purifiers, Separators, Superheated Drains, Turbine Throttle Valve Drips, Pressure Reducing Valves, etc. Large capacity, positive action. Handles pressures up to 1,500 lbs. at 1000° max. temperature. *Write today for Bulletin No. 740*



W. H. NICHOLSON & CO.
125 Oregon Street Wilkes-Barre, Pennsylvania, U. S. A.

Cochrane Corp, 3106 N 17th St, Philadelphia, Pa.
Adv. pages 186, 192, 206, 214
Edison, Thomas A, West Orange, N. J.
Engelhard, Charles, Inc, 234 NJRR Ave, Newark, N. J.
Foxboro Co, 38 Neponset Ave, Foxboro, Mass.
Adv page 156
Friez, Julien P, & Sons Inc, 4 N Central Ave, Baltimore, Md.
Johnson Service Co, 509 E Michigan St, Milwaukee, Wis.
Leeds & Northrup Co, 4970 Stenton Ave, Philadelphia, Pa.
Adv page second cover
Manning, Maxwell & Moore, Inc, Bridgeport, Conn.
Marsh, Jas P, Corp, 2049 Southport Ave, Chicago, Ill.
Mason-Neilan Regulator Co, 1186 Adams St, Boston, Mass.
Moeller Instrument Co, 132-02 89th Ave, Richmond Hill, N. Y.
Palmer Co, 2501-A Norwood Ave, Cincinnati, Ohio
Powers Regulator Co, 2815 Greenview Ave, Chicago, Ill.
Republic Flow Meters Co, 2222 Diversey Pkwy, Chicago, Ill.
Adv pages 171, 176, 192, 221
Tagliabue, C J, Mfg Co, Park & Nostrand Aves, Brooklyn, N. Y.
Taylor Instrument Cos, Rochester, N. Y.
Adv page 235
U. S. Gauge Co, 44 Beaver St, New York, N. Y.
Adv page 182
Wagner, Carl H, & Son, N Albany Ave, Chicago, Ill.
Weston Electrical Instrument Corp, 614 Frelinghuysen Ave, Newark, N. J.
Adv pages 163, 210

THERMOSTATIC VALVES

(See Valves, Thermostatic)

THERMOSTATS

American Radiator Co, 40 W 40th St, New York, N. Y.
Atlas Valve Co, 289 South St, Newark, N. J.
Adv page 221
Bailey Meter Co, 1036 Ivanhoe Rd, Cleveland, Ohio
Adv page 173
Barber-Colman Co, Rockford, Ill.
Bristol Co, Waterbury, Conn.
Burling Instrument Co, 253 Springfield Ave, Newark, N. J.
Edison, Thomas A, West Orange, N. J.
Fenwal, Inc, 100 Main St, Ashland, Mass.
Fulton Sylphon Co, Knoxville, Tenn.
Adv page 205
General Controls Co, 267 5th Ave, New York, N. Y.
Johnson Service Co, 509 E Michigan St, Milwaukee, Wis.
Mercoid Corp, 4229 Belmont Ave, Chicago, Ill.
Minneapolis - Honeywell Regulator Co, 4490 Wayne Ave, Phila, Pa.
Powers Regulator Co, 2815 Greenview Ave, Chicago, Ill.
Sarco Co, Inc, 183 Madison Ave, New York, N. Y.
Adv page 215
Tagliabue, C J, Mfg Co, Park & Nostrand, Brooklyn, N. Y.
Tallmadge Webster & Co, Inc, 255 N 18th St, E Orange, N. J.
Taylor Instrument Cos, Rochester, N. Y.
Adv page 235
Wheelco Instruments Co, 1929 S Halstead St, Chicago, Ill.
Adv page 162

TOWERS, COOLING

Binks Mfg Co, 3114-40 Carroll Ave, Chicago, Ill.
Braun, C F, & Co, 1000 S Fremont Ave, Alhambra, Calif.
Buffalo Forge Co, 488 Broadway, Buffalo, N. Y.
Adv page 160
Burhorn, Edwin, Co, 554 W 48th St, New York, N. Y.
Fluor Corp Ltd, 2500 S Atlantic Blvd, Los Angeles, Calif.
Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 24-25
Lilie-Hoffman Cooling Towers, 4239 Duncan Ave, St. Louis, Mo.
Lummus Co, 420 Lexington Ave, New York, N. Y.
Marley Co, Fairfax Rd & Marley Ave, Kansas City, Kans.
Adv page 30
Murray, D J, Mfg Co, Wausau, Wis.
Schubert-Christy Corp, 1600 Georgia St, Affton Station, St. Louis, Mo.
Wheeler, C H, Mfg Co, Lehigh & Sedgley Aves, Phila, Pa.

TRANSFORMERS, ELECTRIC

Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
Erie Electric Co, 124 Church St, Buffalo, N. Y.
Adv page 212
Forbes & Myers, 174 Union St, Worcester, Mass.
General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
Roller-Smith Co, 1766 W Market St, Bethlehem, Pa.
Wagner Electric Corp, St Louis, Mo.
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53

TRANSMISSIONS, VARIABLE-SPEED, HYDRAULIC

American Blower Co, 6000 Russell St, Detroit, Mich.
American Engrg Co, Amaringo Ave, Philadelphia, Pa.
Adv pages 12-13
Oilgear Co, 1421 W Bruce St, Milwaukee, Wis.
Vickers, Inc, Detroit, Mich.
Waterbury Tool Co, Waterbury, Conn.

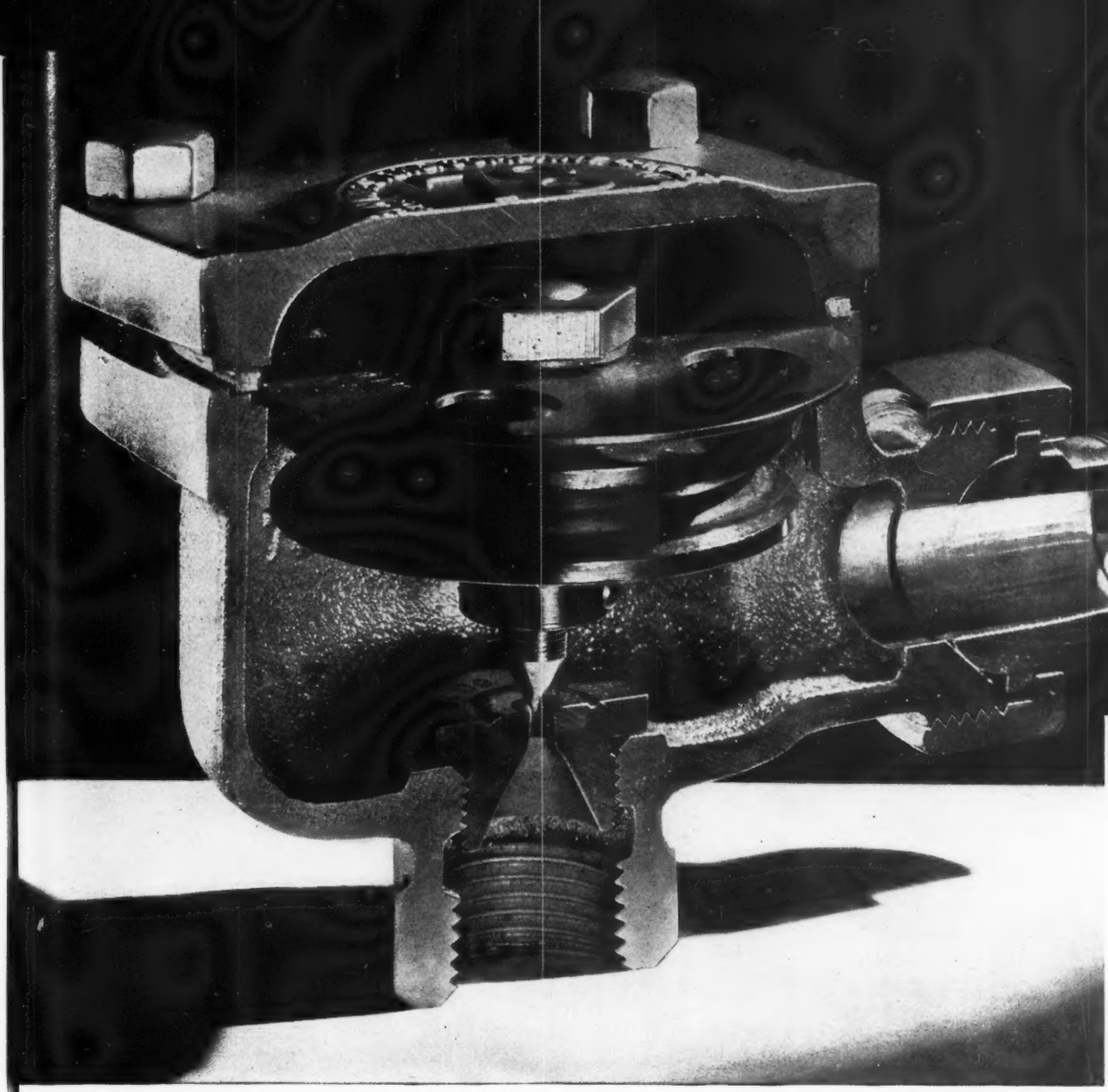
TRANSMISSIONS, VARIABLE-SPEED, MECHANICAL, ELECTRICAL

Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
Columbia Vari-Speed Co, 137 Liberty Drive, Wheaton, Ill.
Electric Machinery Mfg Co, 1331 Tyler St, N E, Minneapolis, Minn.
Equipment Engrg Co, 2853 Columbus Ave, Minneapolis, Minn.
Graham Transmissions, Inc, Milwaukee, Wis.
Ideal Commutator Dresser Co, 1025 Park Ave, Sycamore, Ill.
Janette Mfg Co, 556 West Monroe St, Chicago, Ill.
Lenney Machine & Mfg Co, Warren, Ohio
Lewellen Mfg Co, Maple Ave, Columbus, Ind.
Link-Belt Co, 2045 Hunting Park Ave, Philadelphia, Pa.
Adv page 3
Moore & White Co, Philadelphia, Pa.
Morse Chain Co, Ithaca, N. Y.
Adv page Third Cover
Reeves Pulley Co, 1000 N Reed St, Columbus, Ind.
Stephens-Adamson Mfg Co, 5 Ridgeway Ave, Aurora, Ill.
Sterling Electric Motors, Inc, Los Angeles, Calif.
U. S. Electrical Motors, 200 E Slauson Ave, Los Angeles, Cal.
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53

TRAPS, COMPRESSED-AIR

(See Also Strainers)

Armstrong Machine Works, 812 Maple St, Three Rivers, Wis.
Adv pages 16-17
Illinois Engineering Co, Chicago, Ill.
Keckley, O C, Co, Chicago, Ill.
McAuley Trap Co, Dept 702, 405 Penn Ave, Pittsburgh, Pa.
Moorehead Mfg Co, Detroit.
Nicholson, W H, & Co, 125 Oregon St, Wilkes-Barre, Pa.
Adv pages 180, 212, 214
Squires, C E, Co, 40th St & Kelley Ave, Cleveland, Ohio
Adv page 158



½" Webster 782 Trap—Class 2 for pressures up to 60 lbs. per sq. in.; Class 3 for pressures up to 125 lbs. per sq. in. (to 150 lbs. on special order). Heavy steam brass body. Brass forged bonnet and nut. Nipple turned from solid brass bar stock. Sharp-edged stainless steel renewable seat. 60-degree stainless steel valve piece. Heavy gauge Monel metal diaphragm mounted on heavy brass plate, held in position by copper asbestos gasket and bonnet, fastened with Monel metal cap screws. Triple-sealed diaphragm joints. Fully compensated for pressure *throughout* the operating range. Made in ⅜", ½", ¾" and 1" sizes.

WEBSTER PRODUCTS

Process Steam Traps
Radiator Valves
Thermostatic Traps
Dirt Pockets
Dirt Strainers
Lift Fittings
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Air Separating Tanks
Concealed (non-ferrous) Radiators
Unit Heaters
Boiler Protectors
Boiler Return Traps
Vent Traps
Vacuum and Vapor Systems of Steam Heating
Central Heat Controls
Heating Modernization Programs

—watch-dog of economy

The Webster Series "78" Trap is not merely an adaptation of low-pressure design for high-pressure service . . . It is a *process steam trap.*

Formerly, engineers often had to be content with traps providing intermittent condensation drainage and faulty air elimination, or with frequent replacement of thermostatic traps not designed for pressures and temperatures in the 100-150 lb. range.

To users of process steam, Webster Series "78" Traps introduced a new standard of performance —the application of a separate *sturdy* long-lived trap to each unit, insuring continuous and complete air elimination with simple and inexpensive interior replacement.

Webster Series "78" Traps are insuring top-notch results in the operation of:

Steam-jacketed kettles, flat-work ironers, textile driers, copper plating tanks, tailor's presses, sterilizers, pasteurizers, blanket warmers, steam tables, proving boxes, dish washers, starch kettles, paper driers and hosiery driers.

The facts are available to you through Webster Representatives in 65 principal cities. Consult your local telephone directory or address:

WARREN WEBSTER & COMPANY, CAMDEN, N. J.
Pioneers of the Vacuum System of Steam Heating:: Est. 1888
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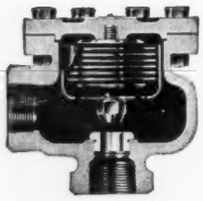
For complete information on Webster process steam products, including tested application data, ask for Bulletin 1200D.

-since 1888
Webster
Systems of Steam Heating

NICHOLSON
THERMOSTATIC STEAM TRAPS



Large Capacity—two to six times greater valve area than average.
No Air Binding—all types discharge air as efficiently as water.
No Freeze-Ups—they drain completely when cold.
No Adjustment—use same size valve and seat from vacuum to max. pressure.
No Dribbling—water-sealed discharge trap is wide open when cold—shut upon contact with steam.
Four Types take care of every industrial trap requirement.

Write for Construction Details and Prices

W. H. NICHOLSON & CO.
125 Oregon Street Wilkes-Barre, Pennsylvania, U. S. A.

Extraordinary Discharge Capacity

VALVE: Perfectly balanced; has large ports for handling water rapidly; less pressure needed to expel condensate.

VALVE SEAT Sleeve has longitudinal ports. No stuffing box to leak.

INLET AT TOP: No possibility of trap becoming air-bound; deflector prevents entering water from striking float.

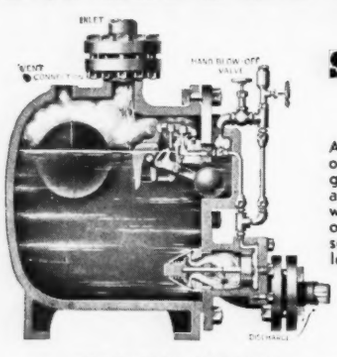
MULTIPORT DRAINER

The Cochrane Multiport Drainer is a low pressure trap, especially suited for operations at low differential pressures and where large quantities of condensate must be handled instantly and continuously. Five sizes, constructed of suitable materials to withstand various operating conditions to 200 lb. working pressure and 750°, make Cochrane a complete line.

Write for bulletin 2925 containing capacity charts and price lists of drainers to meet your specifications. Cochrane Corporation, 3106 N. 17th St., Philadelphia, Pa.

Also manufacturers of Separators, Dischargers, Multiport Relief Valves, Blow-Off Valves, etc.

COCHRANE
NICHOLSON



PISTON-OPERATED STEAM TRAP

The Last Word in High Pressure Traps

A positive, instantaneous trap which occupies smaller space yet has a greater capacity than any others available. The discharge valve is non-wire-drawing type, being entirely open or closed at all times. All valves, seats and working parts are of stainless steel for long, trouble-free operation . . . For Super-Pressures and Super-Heat in The Super Power Plant.

Write for Operating Details

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Staynew Filter Corp, Rochester, N. Y.
Adv page 241
Strong, Carlisle & Hammond Co, 1392 W 3rd St, Cleveland, Ohio
Swartwout Co, 18501 Euclid Ave, Cleveland, Ohio
Adv pages 20-21
Watson & McDaniel Co, 441 N Marshall St, Phila, Pa.
Wright-Austin Co, Detroit, Mich.

TRAPS, RETURN

Cashin, W D, Co, 69 A St, Boston, Mass.
Crane Co, 836 S Michigan Ave, Chicago, Ill.
Adv page 113
Dunham, C A, Co, 450 E Ohio St, Chicago, Ill.
Hoffman Specialty Co, Inc, Waterbury, Conn.
Kieley & Mueller Inc, 40 W 13th St, New York, N. Y.
Marsh, Jas P, Corp, 2049 Southport Ave, Chicago, Ill.
Moorehead Mfg Co, Detroit, Mich.
Reading-Pratt & Cady Div, American Chain & Cable Co, Inc, Reading, Pa.
Schaub, Fred H, Engrg Co, 325 W Huron St, Chicago, Ill.
Stickle Steam Specialties Co, 2217 Valley Ave, Indianapolis, Ind.
Strong, Carlisle & Hammond Co, 1392 W 3rd St, Cleveland, O.
Swartwout Co, 18501 Euclid Ave, Cleveland, Ohio
Adv pages 20-21
Templeton Bros, Inc, 189 Belgrade Ave, Roslindale, Mass.

TRAPS, STEAM

American District Steam Co, 70 Bryant St, N Tonawanda, N.Y.
Adv page 242
Anderson, V D, Co, 1934 W 96th St, Cleveland, Ohio
Armstrong Machine Works, 812 Maple St, Three Rivers, Mich.
Adv pages 16-17
Atwood & Morrill Co, Salem, Mass.
Cashin, W D, Co, 69 A St, Boston, Mass.
Cash Universal Regulator Co, Marshalltown, Iowa
Cochrane Corp, 3106 N 17th St, Philadelphia, Pa.
Adv pages 186, 192, 206, 214
Coe Mfg Co, Painesville, Ohio
Crane Co, 836 S Michigan Ave, Chicago, Ill.
Adv page 113
Cryer Trap & Valve Co, 366 Madison Ave, New York, N. Y.
Adv page 136
Davis Engrg Corp, 1064-16 E Grand St, Elizabeth, N. J.
Davis Regulator Co, 2540 S Washtenaw Ave, Chicago, Ill.
Dunham, C A, Co, 450 E Ohio St, Chicago, Ill.
Fisher Governor Co, 400 Fisher Bldg, Marshalltown, Iowa
Hoffman Specialty Co, Inc, Waterbury, Conn.
Illinois Engrg Company, Chicago, Ill.
Justus Steam Trap Co, Box 26, Napanoch, N. Y.
Kaye & MacDonald, 91 Franklin Ave, West Orange, N. J.
Keckley, O C, Co, Chicago, Ill.
Kieley & Mueller Inc, 40 W 13th St, New York, N. Y.
Kitts Steam Specialty Co, 270 W 2nd St, Oswego, N. Y.
Klipfel Mfg Co, Chicago, Ill.
Adv page 222
Marsh, Jas P, Corp, 2049 Southport Ave, Chicago, Ill.
McAuley Trap Co, Dept 702, 405 Penn Ave, Pittsburgh, Pa.
Minneapolis-Honeywell Regulator Co, 4490 Wayne Ave, Phila, Pa.
Monash-Younker Co, W Congress St, Chicago, Ill.
Nicholson, W H, & Co, 125 Oregon St, Wilkes-Barre, Pa.
Adv pages 180, 212, 214
Plouff Co, 1150 Columbus Ave, Boston, Mass.
Powers Regulator Co, 2815 Greenview Ave, Chicago, Ill.
Reading-Pratt & Cady Div, American Chain & Cable Co, Inc, Reading, Pa.
Sarco Co, Inc, 183 Madison Ave, New York, N. Y.
Adv page 215
Squires, C E, Co, E 40th St & Kelley Ave, Cleveland, O.
Adv page 158
Stickle Steam Specialties Co, 2217 Valley Ave, Indianapolis, Ind.
Strong, Carlisle & Hammond Co, 1392 W 3rd St, Cleveland, O.
Swartwout Co, 18501 Euclid Ave, Cleveland, Ohio
Adv pages 20-21
Tagliabue, C J, Mfg Co, Park & Nostrand Aves, Brooklyn, N. Y.
Watson & McDaniel Co, 441 N Marshall St, Phila, Pa.
Webster, Warren, & Co, Camden, N. J.
Adv page 213
Williams Gauge Co, 1938 Penna. Ave, N S, Pittsburgh, Pa.
Adv page 219
Wright-Austin Co, Detroit, Mich.
Yarnall-Waring Co, Chestnut Hill, Philadelphia, Pa.
Adv pages 101, 178, 193, 218, 224

TREADS, LADDER AND STAIR

American Abrasive Metals Co, Irvington, N. J.
Arrowhead Iron Works, 431 W 5th St, Kansas City, Mo.
Blaw-Knox Co, Pittsburgh, Pa.
Diamond Mfg Co, Wyoming, Pa.
Hendrick Mfg Co, Carbondale, Pa.
Irving Subway Grating Co, 50–09 27th St, Long Island City, N. Y.
Kirk & Blum Mfg Co, 2831 Spring Grove Ave, Cincinnati, O.
Klemp, William F, Co, 6601 S Melvina Ave, Chicago, Ill.
Adv page 184
Tri-Lok Co, 5515 Butler St, Pittsburgh, Pa.
Universal Safety Tread, Inc, Lowell, Mass.

TUBES, BOILER, SUPERHEATER

Allegheny Ludlum Steel Corp, Pittsburgh, Pa.
Babcock & Wilcox Co, 85 Liberty St, New York, N. Y.
Adv pages 4-5
Bethlehem Steel Co, Bethlehem, Pa.
Boiler Tube Co of America, 3126 Preble Ave, Pittsburgh, Pa.
Adv page 236
Detroit Seamless Steel Tubes Co, Grand River Sta, Detroit, Mich.
Globe Steel Tubes Co, 4051 W Burnham St, Milwaukee, Wis.
Jones & Laughlin Steel Co, Pittsburgh, Pa.
Lockport Engrg Works, Inc, Lockport, N. Y.
National Tube Co, Pittsburgh, Pa.
Ohio Seamless Tube Co, Shelby, Ohio
Pittsburgh Pipe Coil & Bending Co, Pittsburgh, Pa.
Steel & Tubes Div, Republic Steel Corp, 218 E 131st St, Cleveland, Ohio
Adv page 149
Timken Roller Bearing Co, Canton, Ohio.
Youngstown Sheet & Tube Co, Youngstown, Ohio
Adv page 153
Wheeling Steel Co, Wheeling, W. Va.

TUBES, CONDENSER

American Brass Co, Waterbury, Conn.
Adv page 115
Bridgeport Brass Co, 774 E Main St, Bridgeport, Conn.
Chase Brass & Copper Co, Waterbury, Conn.
Globe Steel Tubes Co, 4051 W Burnham St, Milwaukee, Wis.
Phelps Dodge Copper Products Corp, 40 Wall, New York, N. Y.
Revere Copper & Brass Co, 230 Park Ave, New York, N. Y.
Adv page 103
Scovill Mfg Co, 99 Mill St, Waterbury, Conn.
Steel & Tubes Div, Republic Steel Corp, Cleveland, Ohio
Adv page 149
Wolverine Tube Co, Detroit, Mich.

TUBES, PITOT

American Blower Corp, 6000 Russell St, Detroit, Mich.

Look for the noun in the product listing, for example:

"Rings, Piston"
not
"Piston Rings"

Bacharach Ind Instrument Co, 7000 Bennett, Pittsburgh, Pa.
Adv pages 183, 188
Ellison Draft Gage Co, 214 W Kinzie St, Chicago, Ill.

TUBING, GLASS

Corning Glass Works, Dept IP, Corning, N. Y.
Fischer & Porter Co, 59 W Queen Lane, Germantown, Phila, Pa.

TUBING, FLEXIBLE METAL

American Metal Hose Branch of American Brass Co, Waterbury, Conn.
Atlantic Metal Hose Co, 107 W 64th St, New York, N. Y.
Adv page 215
Chicago Metal Hose Corp, 1312 S 3rd Ave, Maywood, Ill.
Federal Metal Hose Corp, 277 Military Rd, Buffalo, N. Y.
Fischer, Charles, Spring Co, 240 Kent Ave, Brooklyn, N. Y.
Mall Tool Co, 7740 S Chicago Ave, Chicago, Ill.
Mulconroy Co, 54th & Jefferson Sts, Philadelphia, Pa.
Pennsylvania Flexible Metallic Tubing Co, 7202 Powers Lane, Philadelphia, Pa.
Seamlex Co, 5-20 48th Ave, Long Island City, N. Y.
Titeflex Metal Hose Co, Frelinghuysen Ave, Newark, N. J.
United Metal Hose Co, 3601 43rd Ave, Long Island City, N. Y.

TURBINES, HYDRAULIC

Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
Baldwin-Southwark Div, Baldwin Locomotive Works, Philadelphia, Pa.
De Laval Steam Turbine Co., Trenton, N. J.
Adv pages 50, 201
Holyoke Machine Co, Holyoke, Mass.
Hunt, Rodney, Machine Co, Orange, Mass.
Leffel, James, & Co, Springfield, Ohio
Newport News Shipbuilding and Dry Dock Co, Newport News, Va.
Pelton Water Wheel Co, San Francisco, Calif.
Smith, S Morgan, Co 500 Lincoln St, York, Pa.

TURBINE OILS

(See Oils, Lubricating)

TURBINES, STEAM

Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
Carling Turbine Blower Co, 25 St John's Rd, Worcester, Mass.
Coppus Engrg Corp, 350 Park Ave, Worcester, Pa.
Dean Hill Pump Co, Anderson, Ind.
De Laval Steam Turbine Co, Trenton, N. J.
Adv pages 50, 201
Elliott Co, Jeannette, Pa.
Adv pages 6-7
General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Moore Steam Turbine Div, Worthington Pump & Machinery Corp, Wellsville, N. Y.
Murray Iron Works Co, Burlington, Iowa
Adv page 46
Sturtevant, B F, Co, 47 Readville St, Hyde Park, Boston, Mass.
Terry Steam Turbine Co, Box 1200, Hartford, Conn.
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53
Whiton, D E, Machine Co, New London, Conn.
Worthington Pump & Machinery Corporation, Harrison, N. J.
Wing, L J Mfg Co, W 14th St & 7th Ave, New York, N. Y.
Adv page 164

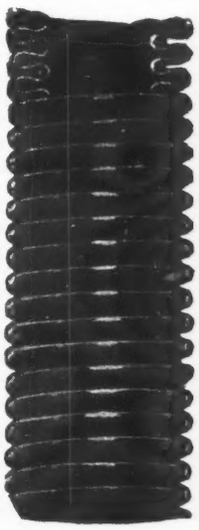
TURBOBLOWERS

Allen Billmyre Corp, Daily News Building, New York, N. Y.
Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
Carling Turbine Blower Co, 25 St John's Rd, Worcester, Mass.
Coppus Engrg Corp, 350 Park Ave, Worcester, Mass.
Elliott Co, Jeannette, Pa.
Adv pages 6-7
Ingersoll-Rand Co, 11 Broadway, New York, N. Y.
Adv pages 38-39
Power Turbo-Blower Co, 30 Vesey St, New York, N. Y.
Roots-Connersville Blower Corp, Connersville, Ind.
Spencer Turbine Co, 488 New Park Ave, Hartford, Conn.
Sturtevant, B F, Co, 47 Readville St, Hyde Park, Boston, Mass.
Wing, L J Mfg Co, W 14th St & Seventh Ave, New York, N. Y.
Adv page 164

ATLANTIC
Flexible Metal Hose

for High Pressure Steam, Oil, Water and Chemicals • for Diesel Engine Exhaust

Atlantic Flexible Metal Hose is available in types and sizes for handling steam, petroleum, tar, asphalt and cutting compounds. It withstands high temperatures, absorbs vibrations and expansion. Can be used for both suction and discharge applications. Our engineering department will assist you in selecting the hose best adapted to meet your conditions. Bulletins on all types available on request.



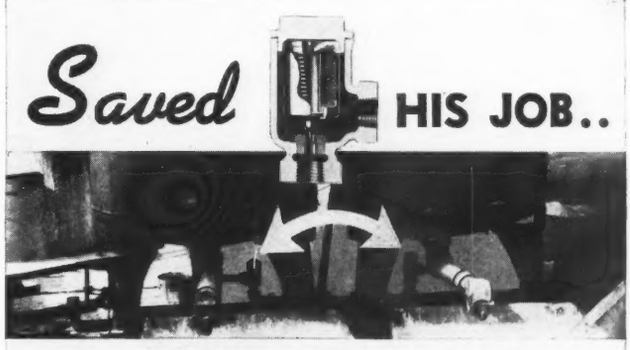
Available in Four Wall Interlocking construction (shown) for heavy duty service in steel or bronze. Sizes from 3/16 to 10 in. inclusive.

Also made in seamless flexible type in sizes from 3/16 to 4 in. inclusive.

Made in sizes from 1½ to 20 in. Inclusive of seamless welded construction. Maintains flexibility at extremely high temperatures. Furnished with standard floating type flanges.

ATLANTIC METAL HOSE CO., INC.
107 WEST 64th ST. NEW YORK, N. Y.

Saved HIS JOB..



WITH SARCO No. 9 STEAM TRAPS

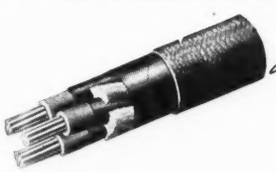
The engineer of the Overland Candy Company in Chicago staked his job on Sarco No. 9's a couple of years ago. Foremen were calling for more heat and yet he knew that more steam than necessary was being used. Now on the job, he finally succeeded in getting the management to try out Sarco No. 9's. Now it's ALL-SARCO—the foremen are satisfied, even in the chocolate warming sections, and a material steam economy has been effected.

Did it take nerve for this engineer to risk his new job on Sarco No. 9's? Not at all. He began using these Sarco Traps sixteen years ago, in Brooklyn, New York. He says that he would have risked his job if he hadn't insisted on Sarco No. 9's. Ask for Catalog No. 48.

SARCO SAVES STEAM
SARCO COMPANY, INC.
183 Madison Avenue, New York, N. Y.
SARCO CANADA LTD., FEDERAL BLDG., TORONTO, ONT.

WIRES and CABLES

Everything Electrical
GraybaR ELECTRIC COMPANY



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All types of wires and cables including Rubber-Covered, Braided and Leaded Wire, Varnished Cambric, Boiler Room Wire and Portable Cords.

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IN OVER 80 PRINCIPAL CITIES

When in need of

Conduit for Underground Pipe Lines

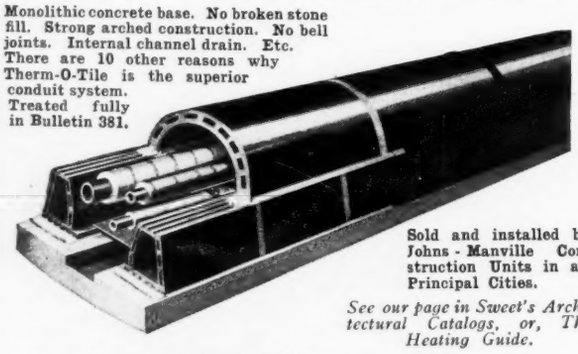
specify

THERM-O-TILE

Reg. U. S. Pat. Off.

SIMPLEST • STRONGEST • MOST EFFICIENT

Monolithic concrete base. No broken stone fill. Strong arched construction. No bell joints. Internal channel drain. Etc. There are 10 other reasons why Therm-O-Tile is the superior conduit system. Treated fully in Bulletin 381.



Sold and installed by Johns - Manville Construction Units in all Principal Cities.

See our page in Sweet's Architectural Catalogs, or, The Heating Guide.

H. W. PORTER & CO., Inc.

827-P Frelinghuysen Ave., Newark, N. J.

Without obligating us in any way, ☐ Please send Bulletin 381. ☐ Send representative. ☐ Enclosed is a sketch, with principal data of a prospective job on which we shall be glad to have your comments or quotations.

Name .....

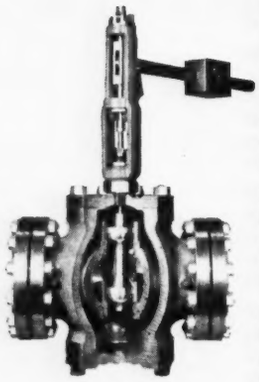
Firm .....

Street .....

City ..... State.....

CASH STANDARD Series 42

BALANCED LEVER VALVES



For use with steam, water (hot or cold), air, oil, ammonia, various gases.

Handling hot or cold liquids or gases, they control inflow or outflow—to open or closed tanks, feed water heaters, pumps, boilers, purifiers, accumulators, stills, fractionating towers, etc.

They maintain constant valve inlet pressure and outlet pressure, a constant differential pressure, constant liquid levels, or regulate rate of flow.

Operated by automatic controllers, floats, solenoids, thermostats, hydraulic pistons, pneumatic pistons, cables, and other devices.

Manufactured under highest standards

Accurate machining insures perfect alignment—roller guides kill side strains and save packing—easy lever adjustment—large capacity—walls very thick and uniform—both cast Pivot Link and Steel Lever carried on large diameter Nitralloy pins—both double and single seat types shut dead tight on test before shipment—any valve lever movement gives you instant positive inner valve movement without play or lost motion. All standard metals and trims; sizes ½" to 12". Write for Bulletin No. 965.

A. W. CASH COMPANY
DECATUR, ILLINOIS

CASH STANDARD
CONTROLS . . VALVES

UNDERGROUND STEAM CONDUIT

American District Steam Co, 70 Bryant St, N Tonawanda, N. Y.
Adv page 242

Ehret Magnesia Mfg Co, Inc, Valley Forge, Pa.
Adv page 231

Porter, H W, & Co, 827-P Frelinghuysen Ave, Newark, N. J.
Adv page 216

Ric-wil Co, 1563 Union Commerce Bldg, Cleveland, Ohio
Adv page 148

UNIONS

American Pumps, Inc., Cincinnati, Ohio

Central Forging, Catawissa, Pa.

Clayton-Mark & Co, 1900 Deupster St, Evanston, Ill.

Crane Co, 836 S Michigan Ave, Chicago, Ill.
Adv page 113

Dart, E M, Mfg Co, 134 Thurbers Ave, Providence, R. I.

Fairbanks Co, 397 Lafayette St, New York, N. Y.
Adv page 244

Gaso Pump & Burner Mfg Co, Tulsa, Okla.

Jarecki Mfg Co, Erie, Pa.
Adv page 242

Jefferson Union Co, 601 W 26th St, New York, N. Y.

Kennedy Valve Mfg Co, Elmira, N. Y.

Leahy Mfg Co, Los Angeles.

Lunkenheimer Co, Box 360, Annex Station, Cincinnati, O.
Adv pages 14-15

Malleable Iron Fittings Co, Branford, Conn.

Mark, Clayton, & Co, Box 467, Evanston, Ill.

Pittsburgh Valve & Fittings Corp, Barberton, Ohio

Rhode Island Fittings Co, Hillsgrove, R. I.

Rhode Island Malleable Iron Works, Hillsgrove, R. I.

Rockwood Sprinkler Co, 54 Harlow St, Worcester, Mass.

Sherman, H B, Mfg Co, Battle Creek, Mich.

Standard Union Co, Lockport, N. Y.

United Superior Union Co, 29 Ryerson St, Brooklyn, N. Y.

Vogt, Henry, Machine Co, 1000 W Ormsby St, Louisville, Ky.
Adv page 217

Walworth Co, 60 E 42nd St, New York, N. Y.
Adv page 237

USED EQUIPMENT

(See Searchlight Section of this issue, page 245, and Classified Directory, page 247, December POWER)

VACUUM-CLEANING SYSTEMS

(See Cleaning Systems, Vacuum)

VALVE OPERATORS, HAND-CHAIN

Babbitt Steam Specialties Co, 55 S Water St, New Bedford, Mass.
Adv page 142

Crane Co, 836 S Michigan Ave, Chicago, Ill.
Adv page 113

VALVE OPERATORS, MOTOR

Chapman Valve Mfg Co, Pinevale St, Indian Orchard, Mass.

Crane Co, 836 S Michigan Ave, Chicago, Ill.
Adv page 113

Cutler-Hammer Inc, 606 N 12th St, Milwaukee, Wis.
Adv page 99

Philadelphia Gear Works, Erie Ave & G St, Phila, Pa.
Adv page 44

VALVE-RESEATING MACHINES

Leavitt Machine Co, 8 E River St, Orange, Mass.

VALVES, AMMONIA, CARBON-DIOXIDE

Baker Ice Machine Co, Omaha, Neb.

Cash, A W, Co, 402 N Eldorado St, Decatur, Ill.
Adv page 172, 204, 216, 222

Crane Co, 836 S Michigan Ave, Chicago, Ill.
Adv page 113

Edward Valve & Mfg Co, 1150 W 145th St, East Chicago, Ind.

Frick Co, Inc, 325 Broadway, Waynesboro, Pa.
Adv page 140

General Controls Co, 267 5th Ave, New York, N. Y.

Homestead Valve Mfg. Co, PO Box 210, Coraopolis, Pa.
Adv page 157

Jenkins Bros, 80 White St, New York, N. Y.
Adv pages 108-109

Lonergan, J E, Co, Race St, Philadelphia, Pa.

Reading-Pratt & Cady Div, American Chain & Cable Co, 929 Conn. Ave, Bridgeport, Conn.
Adv pages 26-27

Refrigerating Specialties Co, Chicago, Ill.

Vilter Mfg Co, 2217 S 1st St, Milwaukee, Wis.

Vogt, Henry, Machine Co, 1000 W Ormsby St, Louisville, Ky.
Adv page 217

Walworth Co, 60 E 42nd St, New York, N. Y.
Adv page 237

Worthington Pump & Machinery Corp, Harrison, N. J.

York Ice Machinery Corp, York, Pa.

VALVES, BALANCED

Atlas Valve Co, 289 South St, Newark, N. J.
Adv page 221

Atwood & Morrill Co, Salem, Mass.

Bailey Meter Co, 1036 Ivanhoe Rd, Cleveland, Ohio
Adv page 173

Belfield, H, Co, 435 N Broad St, Phila, Pa.

Cash, A W, Co, 402 N Eldorado St, Decatur, Ill.
Adv pages 172, 204, 216, 222

Davis Regulator Co, 2540 Washtenaw Ave, Chicago, Ill.

Defender Automatic Regulator Co, St Louis, Mo.

Fisher Governor Co, 400 Fisher Bldg, Marshalltown, Iowa

Foster Engrg Co, 109 Monroe St, Newark, N. J.
Adv page 228

Golden-Anderson Valve Specialty Co, 1315 Fulton Bldg, Pittsburgh, Pa.
Adv page 223

Illinois Engrg Co, Chicago, Ill.

Kennedy Valve Mfg Co, Elmira, N. Y.

Kieley & Mueller, Inc, 40 W 13th St, New York, N. Y.

Kitts Steam Specialty Co, 270 W Second Ave, Oswego, N. Y.

Klipfel Mfg Co, Chicago, Ill.
Adv page 222

Lewis Steam Specialty & Valve Co, Ashmead St, Philadelphia, Pa.

Mason-Neilan Regulator Co, 1186 Adams St, Boston, Mass.

Mueller Co, Decatur, Ill.

Northern Equipment Co, 1221 Grove Drive, Erie, Pa.
Adv page 111

Philadelphia Valve Co, Aramingo Ave, Philadelphia, Pa.

Power Turbo-Blower Co, 30 Vesey St, New York, N. Y.

Reading-Pratt & Cady Div, American Chain & Cable Co, Inc, Reading, Pa.

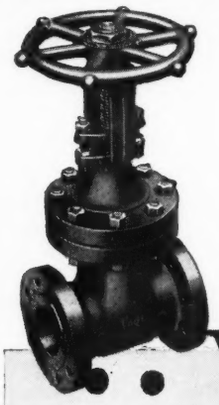
Republic Flow Meters Co, 2222 Diversey Pkwy, Chicago, Ill.
Adv pages 171, 176, 192, 221

Look for the noun in the product listing, for example:

"Valves, Regulating"

not

"Regulating Valves"



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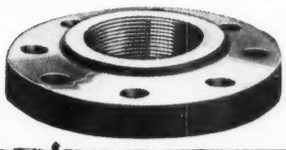
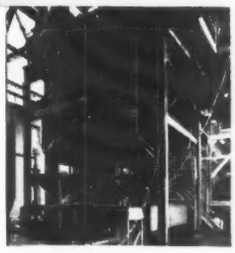
Valves, Fittings and Flanges by Vogt — the choice of operating men everywhere for safe and sure regulation of the high pressure and high temperature liquids and gases used in modern process work.



• • Vogt PRODUCTS are • •

HIGH OPERATING EFFICIENCIES AND LOW MAINTENANCE COSTS

More steam per dollar of investment—because Vogt Boilers are designed and built to fit in with specific operating conditions. Available in bent tube, sectional header, box header and return tubular types using coal, oil, gas or waste heat for fuel.



• • DESIGNED to RAISE • •

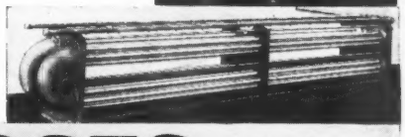
MEETING THE DEMANDS FOR OPERATING SECURITY

Vogt has every facility for the fabrication of stills, towers, continuous rotary filters, filter presses, oil chilling machines, heat exchangers, etc., and these products are serving the petroleum industry around the world.

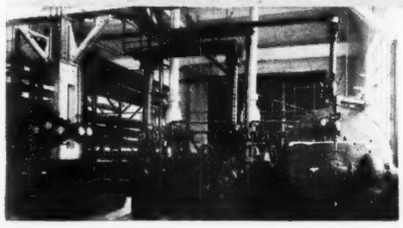
• • OPERATING STANDARDS and • •

TO COMBAT CORROSION AND PREVENT PRODUCT CONTAMINATION

Process equipment made from special metals and alloys for the exacting service of the chemical plant is fabricated in our modern shops for many of the well known chemical companies.



• • LOWER YOUR COSTS • •



STEPS TONNAGE UP AND COSTS DOWN

Our experience of more than a half-century in building profit-making ice and refrigerating machinery is at your command. We make complete units for ice and cold storage plants, packing plants, dairies, breweries, chemical plants, oil refineries and related industries.

Vogt PRODUCTS

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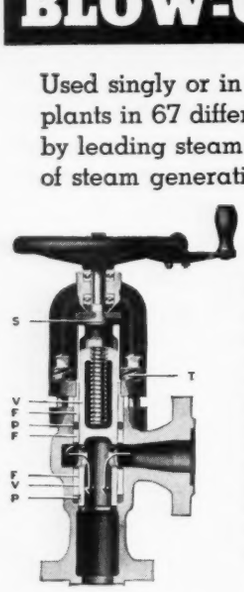
CINCINNATI
ST. LOUIS
CHICAGO
DALLAS

HENRY VOGT MACHINE CO., INCORPORATED LOUISVILLE, KENTUCKY

YARWAY BLOW-OFF VALVES

Used singly or in tandem in more than 12,000 plants in 67 different industries. Recommended by leading steam plant designers and builders of steam generating equipment.



Seatless Type

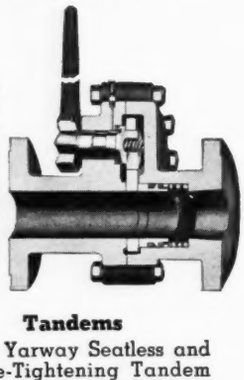
Made in several styles for working pressures up to 1500 lbs. Sizes 1" to 2½". Angle and straightway.

OPERATION: After valve has been closed, shoulder S on plunger V contacts upper follower gland F, forcing it down into body and compressing packing P above and below port, making an absolutely tight valve. Yoke tension springs T maintain continuous compression on packing train. Alemite lubrication of plunger and stem.

Send for celluloid working model and Bulletins B-420 and B-430

Double-Tightening Type

Lever-operated, swing gate design with unique feature of sealing bushing on inlet side, making it double-tightening on both sides of gate. When open provides straight through passage for unobstructed flow. Alemite lubrication of stem and disc. Made in several styles for pressures to 300 lbs. Sizes 1" to 2½". Write for Bulletin B-420.



Tandems

Fig. 1

Fig. 1, Yarway Seatless and Double-Tightening Tandem for pressures of 200 to 300 lbs.

Fig. 2, Yarway Seatless Type C Tandem for 400 to 600 lbs. pressure. Sizes 1" to 2½".

Fig. 2

Fig. 3

Fig. 3, Yarway Unit Tandem Valve in which hard seat valve and seatless valve are mounted together in one-piece forged steel body. Sizes 1" to 2", pressures 600 to 2,500 lbs.

Write for Bulletins B-420 and B-430.

See other Yarway Advertisements on pages 101, 178, 193, 224.

YARNALL-WARING COMPANY
100 MERMAID AVE., PHILA.

Ruggles-Klingemann Mfg Co, Salem, Mass.
Schade Valve Mfg Co, 2527 N Bodine St, Philadelphia, Pa.
Schutte & Koerting Co, 12th & Thompson Sts, Phila, Pa.
Swartwout Co, 18501 Euclid Ave, Cleveland, Ohio
Adv pages 20-21
U. S. Wind Engine & Pump Co, Batavia, Ill.
Waters Governor Co, 1123 Oliver Bldg, Boston, Mass.
Watts Regulator Co, Lawrence, Mass.

VALVES, BLOW-OFF

Belfield, H, Co, 435 N Broad St, Phila, Pa.
Bordo, L J, Co, Glenside, Pa.
Carthage Machine Co, Carthage, N. Y.
Cochrane Corp, 3106 N 17th St, Philadelphia, Pa.
Adv pages 186, 192, 206, 214
Crane Co, 836 S Michigan Ave, Chicago, Ill.
Adv page 113
Edward Valve & Mfg Co, 1150 W 145th St, East Chicago, Ind.
Elliott Co, Jeannette, Pa.
Adv pages 6-7
Everlasting Valve Co, 53 Fisk St, Jersey City, N. J.
Adv page 220
Fairbanks Co, 397 Lafayette St, New York, N. Y.
Adv page 244
Hancock Valve Div, 143 Elias St, Bridgeport, Conn.
Homestead Valve Mfg Co, Box 210, Coraopolis, Pa.
Adv page 157
Jarecki Mfg Co, Erie, Pa.
Adv page 242
Jenkins Bros, 80 White St, New York, N. Y.
Adv pages 108, 109
Keckley, O C, Co, Chicago, Ill.
Kitts Steam Specialty Co, 270 W 2nd St, Oswego, N. Y.
Ludlow Valve Mfg Co, Foot of Adams St, Troy, N. Y.
Lunkenheimer Co, Box 360, Annex Station, Cincinnati, Ohio
Adv pages 14-15
Ohio Injector Co, Wadsworth, Ohio
Powell Wm, Co, Cincinnati, O.
Adv pages 252-253
Strong, Carlisle & Hammond Co, 1392 W 3rd St, Cleveland, O.
Walworth Co, Inc, 60 E 42nd St, New York, N. Y.
Adv page 237
Williams, D T, Valve Co, 2854 Spring Grove Ave, Cincinnati, O.
Yarnall-Waring Co, Chestnut Hill, Philadelphia, Pa.
Adv pages 101, 178, 193, 218, 224

VALVES, CHECK

Alco Valve Co, St. Louis, Mo.
American Pumps, Inc, Cincinnati, Ohio
Baker Ice Mach Co, Omaha, Neb.
Barrett, Haentjens & Co, Hazleton, Pa.
Belfield, H, Co, 435 N Broad St, Phila, Pa.
Boyts, Porter & Co, Connellsville, Pa.
Central Forging Co, Catawissa, Pa.
Chapman Valve Mfg Co, Pinevale St, Indian Orchard, Mass.
Cochrane Corp, 3106 N 17th St, Philadelphia, Pa.
Adv pages 186, 192, 206, 214
Cook, A D, Inc, Lawrenceburg, Ind.
Crane Co, 836 S Michigan Ave, Chicago, Ill.
Adv page 113
Darling Valve & Mfg Co, Williamsport, Pa.
Adv page 234
Davis Regulator Co, 2540 S Washtenaw Ave, Chicago, Ill.
Duriron Co Inc, Dayton, Ohio
Edward Valve & Mfg Co, 1150 W 145th St, East Chicago, Ind.
Fairbanks Co, 397 Lafayette St, New York, N. Y.
Adv page 244
Foster Engrg Co, 109 Monroe St, Newark, N. J.
Adv page 228
Gaso Pump & Burner Mfg Co, Tulsa, Okla.
Golden - Anderson Valve Specialty Co, 1315 Fulton Bldg, Pittsburgh, Pa.
Adv page 223
Goyne Steam Pump Co, Ashland, Pa.
Hancock Valve Div, 143 Elias St, Bridgeport, Conn.
Jarecki Mfg Co, Erie, Pa.
Adv page 242
Jenkins Bros, 80 White St, New York, N. Y.
Adv pages 108-109
Kieley & Muller Co, 40 W 13th St, New York, N. Y.
Kennedy Valve Mfg Co, Elmira, N. Y.
Limbert, Geo B, & Co, 570 Fulton St, Chicago, Ill.
Lunkenheimer Co, Box 360, Annex Station, Cincinnati, O.
Adv pages 14-15
M & H Valve & Fittings Co, Anniston, Ala.
Adv page 219
Milwaukee Valve Co, Milwaukee, Wis.
Mueller Co, Chattanooga, Tenn.
Norgren, C A, Co, 210 Santa Fe Drive, Denver, Colo.
Ohio Injector Co, Wadsworth, Ohio
Parker Appliance Co, 17325 Euclid Ave, Cleveland, Ohio
Pittsburgh Valve & Fittings Corp, Barberton, Ohio
Plouff Co, 1150 Columbus Ave, Boston, Mass.
Powell, Wm, Co, Cincinnati, O.
Adv pages 252-253
Randle Machinery Co, Cincinnati, Ohio
Reading-Pratt & Cady Div, American Chain & Cable Co, 929 Conn Ave, Bridgeport, Conn.
Adv pages 26-27
Ruggles-Klingemann Mfg Co, Salem, Mass.
Schutte & Koerting Co, 12th & Thompson Sts, Phila, Pa.
Stockham Pipe Fittings Co, Birmingham, Ala.
Strong, Carlisle & Hammond Co, 1392 W 3rd St, Cleveland, O.
Taco Heaters Inc, 342 Madison Ave, New York, N. Y.
Trill Indicator Co, 38 E South St, Corry, Pa.
Vogt, Henry, Machine Co. 1000 W Ormsby St, Louisville, Ky.
Adv page 217
Walworth Co, 60 E 42nd St, New York, N. Y.
Adv page 237
Williams Gauge Co, 1938 Penna. Ave, N S, Pittsburgh, Pa.
Adv page 219
Williams, D T, Valve Co, 2854 Spring Grove Ave, Cincinnati, O.

VALVES, COMPRESSED-AIR

Cash, A W, Co, 402 N Eldorado St, Decatur, Ill.
Adv pages 172, 204, 216, 222
Crane Co, 836 S Michigan Ave, Chicago, Ill.
Adv page 113
Edward Valve & Mfg Co, 1150 W 145th St, East Chicago, Ind.
Homestead Valve Mfg Co, Box 210, Coraopolis, Pa.
Adv page 157
Norgren, C A, Co, 210 Santa Fe Drive, Denver, Colo.
Powell, Wm, Co, Cincinnati, O.
Adv pages 252, 253
Vogt, Henry, Machine Co, 1000 W Ormsby St, Louisville, Ky.
Adv page 217

VALVES, DIAPHRAGM

Atlas Valve Co, 289 South St, Newark, N. J.
Adv page 221
Belfield, H, Co, 435 N Broad St, Philadelphia, Pa.
Cash, A W, Co, 402 N Eldorado St, Decatur, Ill.
Adv pages 172, 204, 216, 222
Davis Regulator Co, 2540 S Washtenaw Ave, Chicago, Ill.
Fisher Governor Co, 400 Fisher Bldg, Marshalltown, Iowa
Foster Engrg Co, 109 Monroe St, Newark, N. J.
Adv page 228
General Controls Co, 267 5th Ave, New York, N. Y.
Grove Regulator Co, 1729 Poplar St, Oakland, Calif.
Golden-Anderson Valve Specialty Co, 1315 Fulton Bldg, Pittsburgh, Pa.
Adv page 223

Hancock Valve Div, 143 Elias St, Bridgeport, Conn.
Illinois Engrg Co, Chicago, Ill.
Johnson Service Co, 509 E Michigan St, Milwaukee, Wis.
Kelley & Mueller, Inc, 40 W 13th St, New York, N. Y.
Klipfel Mfg Co, Chicago, Ill.
Adv page 222
Lonergan, J E, Co, Race St, Philadelphia, Pa.
Mason-Neilan Regulator Co, 1186 Adams St, Boston, Mass.
Milwaukee Valve Co, Milwaukee, Wis.
Minneapolis - Honeywell Regulator Co, 4490 Wayne Ave, Phila, Pa.
Mueller Co, Decatur, Ill.
Norgren, C A, Co, 210 Santa Fe Drive, Denver, Colo.
Powers Regulator Co, 2815 Greenview Ave, Chicago, Ill.
Ruggles-Klingemann Mfg Co, Salem, Mass.
Schade Valve Mfg Co, 2527 N Bodine St, Philadelphia, Pa.
Schutte & Koerting Co, 12th & Thompson Sts, Phila, Pa.
Spence Engrg Co, Inc, 61 Grant St, Walden, N. Y.
Adv page 204
Taylor Instrument Cos, Rochester, N. Y.
Adv page 235
Watson & McDaniel Co, 441 N Marshall St, Phila, Pa.

VALVES, ELECTRICALLY OPERATED

Alco Valve Co, St Louis, Mo.
American Radiator Co, 40 W 40th St, New York, N. Y.
Atkins, E C, & Co, Indianapolis, Ind.
Automatic Switch Co, 41 E 11th St, New York, N. Y.
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Darling Valve & Mfg Co, Williamsport, Pa.
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Nicholson, W H, & Co, 125 Oregon St, Wilkes-Barre, Pa.
Adv pages 180, 212, 214
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Schutte & Koerting Co, 12th & Thompson Sts, Phila, Pa.
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Supreme Elect Products Corp, 103 Mt Hope Ave, Rochester, N. Y.
Universal Gear Corp, 1452 E 19th St, Indianapolis, Ind.
Tallmadge, Webster & Co, Inc, 255 N 18th St, E Orange, N. J.
Walworth Co, 60 E 42nd St, New York, N. Y.
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Caldwell, W E, Co Inc, 280 Brandeis St, Louisville, Ky.
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Adv pages 172, 204, 216, 222
Cochrane Corp, 3106 N 17th St, Philadelphia, Pa.
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Davis Regulator Co, 2540 Washtenaw Ave, Chicago, Ill.
Defender Automatic Regulator Co, St Louis, Mo.
Fisher Governor Co, 400 Fisher Bldg, Marshalltown, Iowa
Foster Engrg Co, 109 Monroe St, Newark, N. J.
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Golden-Anderson Valve Specialty Co, 1315 Fulton Bldg, Pittsburgh, Pa.
Adv page 223
Hancock Valve Div, 143 Elias St, Bridgeport, Conn.
Klipfel Mfg Co, Chicago, Ill.
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Mason-Neilan Regulator Co, 1186 Adams St, Boston, Mass.
Milwaukee Valve Co, Milwaukee, Wis.
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Adv page 244
Hancock Valve Div, 143 Elias St, Bridgeport, Conn.
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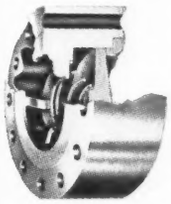

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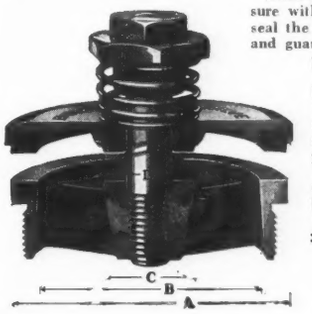

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Cash, A W, Co, 402 N Eldorado St. Decatur, Ill.
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Cash Universal Regulator Co, Marshalltown, Iowa
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FIGURE 1010-300

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FIGURE 1010-350

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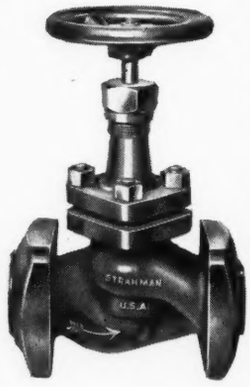

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Trane Co, 2012 Cameron Ave, La Crosse, Wis.
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Adv pages 172, 204, 216, 222

Here are Typical examples of the

ATLAS Regulating Valves

that are listed in this issue of Power.

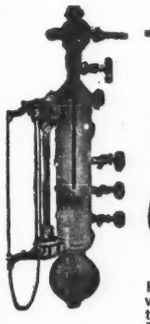

Fig. 700. The CAMPBELL Feed Water Regulator.

Fig. 701. This valve controls the Regulator. The CAMPBELL has no floats, thermostats, generators, or moving parts.

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Make it a habit to put your regulating problems up to ATLAS, always. In other words, Standardize on Atlas Regulating Valves.

Fig. 230. This ATLAS Lever Operated Control Valve is "going places." Are you acquainted with it?

Fig. 503. A VICTOR Damper Regulator. We make them for nearly all pressures and services.

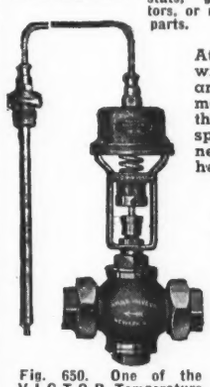

Fig. 650. One of the VICTOR Temperature Regulators.

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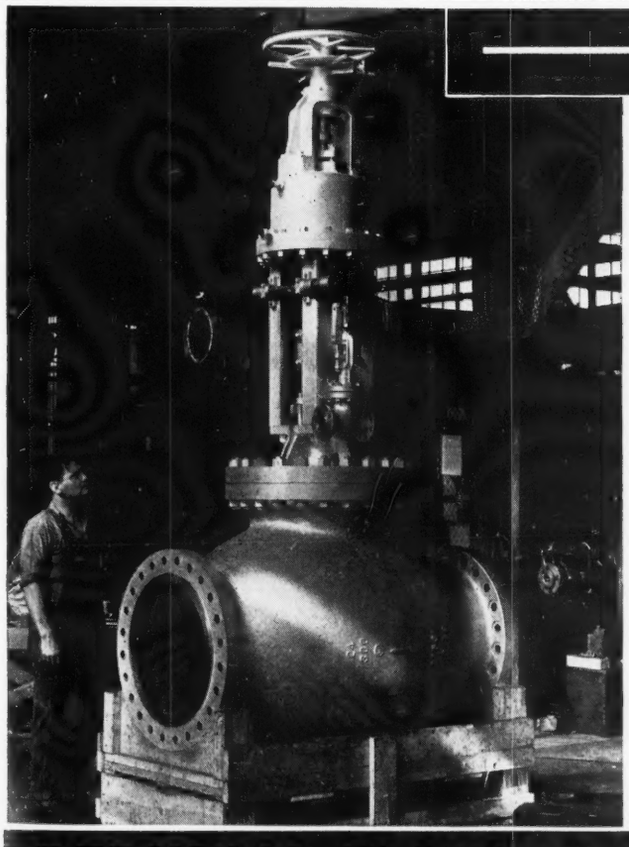

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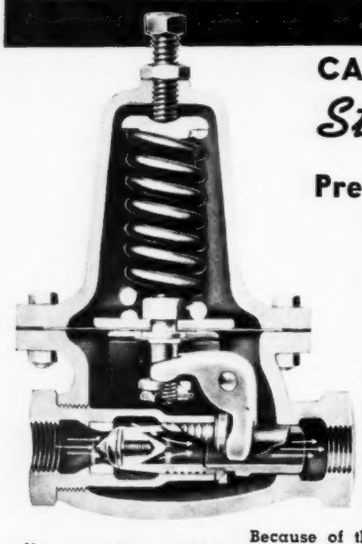

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TYPE 1000

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Ruggles-Klingemann Mfg Co, Salem, Mass.
Schade Valve Mfg Co, 2527 N Bodine St, Philadelphia, Pa.
Schutte & Koerting Co, 12th & Thompson Sts, Phila, Pa.
Standard Valve Mfg Co, Boston, Mass.

VALVES, THERMOSTATIC

American Radiator Co, 40 W 40th St, New York, N. Y.
Atlas Valve Co, 289 South St, Newark, N. J.
Adv page 221
Bristol Co, Waterbury, Conn.
Edison, Thomas A, West Orange, N. J.
Foster Engrg Co, 109 Monroe St, Newark, N. J.
Adv page 228
Fulton Sylphon Co, Knoxville, Tenn.
Adv page 205
General Controls Co, 267 5th Ave, New York, N. Y.
Hoffman Specialty Co, Waterbury, Conn.
Mason-Neilan Regulator Co, 1186 Adams St, Boston, Mass.
Mercoid Corp, 4229 Belmont Ave, Chicago, Ill.
Monash-Younker Co, Chicago, Ill.
Northern Equipment Co, 1221 Grove Drive, Erie, Pa.
Adv page 111
Powers Regulator Co, 2815 Greenview Ave, Chicago, Ill.
Refrigerating Specialties Co, Chicago, Ill.
Ruggles-Klingemann Mfg Co, Salem, Mass.
Sarco Co, Inc, 183 Madison Ave, New York, N. Y.
Adv page 215
Spence Engrg Co, Inc, 61 Grant St, Walden, N. Y.
Adv page 204
Sterling Inc, Milwaukee, Wis.
Taylor Instrument Cos, Rochester, N. Y.
Adv page 235

VARNISHES, INSULATING

Bakelite Corp, 247 Park Ave, New York, N. Y.
General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Keystone Varnish Co, 71 Otsego St, Brooklyn, N. Y.
Tropical Paint & Oil Co, Cleveland, Ohio
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53
White Co, 3200 E Biddle St, Baltimore, Md.

VENTILATING SYSTEMS, VENTILATORS

Airtherm Mfg Co, 700 S Spring Ave, St Louis, Mo.
Allen, E H, Co, Dept P, 22 Dorrance St, Boston, Mass.
American Blower Corp, 6000 Russell St, Detroit, Mich.
Arex Co, 333 N Michigan Ave, Chicago, Ill.
Autoforce Ventilating System, 53 Devonshire St, Boston, Mass.
Buffalo Forge Co, 488 Broadway, Buffalo, N. Y.
Adv page 160
Burt Mfg Co, 232 Main St, Akron, Ohio
Clarage Fan Co, 621 Porter St, Kalamazoo, Mich.
Adv page 147
De Bothezat Ventilating Equipment Div, East Moline, Ill.
Diehl Mfg Co, Elizabethport, N. J.
Garden City Fan Co, 332 S Michigan Ave, Chicago, Ill.
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
Iona Ventilator Co, 2821-29 Dauphin St, Philadelphia, Pa.
Johns-Manville, 22 E 40th St, New York, N. Y.
Adv pages 36-37
Kirk & Blum Mfg Co, 2831 Spring Grove Ave, Cincinnati, O.
Stearns-Roger Mfg Co, Denver, Colo.
Sterling Blower Co, 791 Windsor St, Hartford, Conn.
Sturtevant, B F, Co, 47 Readville St, Hyde Park, Boston, Mass.
Trane Co, 2012 Cameron Ave, La Crosse, Wis.
Typhoon Air Conditioning Co, 252 W 26th, New York, N. Y.
Western Blower Co, 1800-9th Ave, Seattle, Wash.
Wing, L J, Mfg Co, W 14th St & 7th Ave, New York, N. Y.
Adv page 164
Young & Bertke Co, 1040 W Hulbert Ave, Cincinnati, Ohio

VOLTMETERS

Bristol Co, Waterbury, Conn.
Esterline Angus Co, Box 596, Indianapolis, Ind.
General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Roller-Smith Co, 1766 Market St, Bethlehem, Pa.
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53
Weston Electrical Instrument Corp, 614 Frelinghuysen Ave, Newark, N. J.
Adv pages 163, 210

WALLS, BOILER-FURNACE, AIR-COOLED

American Arch Co, Inc, 68 E 42nd St, New York, N. Y.
Bernitz Furnace Appliance Co, 89 Broad St, New York, N. Y.
Bigelow-Liptak Corp, 2840 W Grand Blvd, Detroit, Mich.
Chicago Fire Brick Co, 1463 Elston Ave, Chicago, Ill.
Detrick, M H, Co, 140 S Dearborn, Chicago, Ill.
DeWolf Furnace Corp, 77 South Ave, Rochester, N. Y.
Adv page 223
Drake Non-Clinkering Furnace Block Co, Beekman St, New York, N. Y.
Engineer Co, 75 West St, New York, N. Y.
Kennedy-Van Saun Mfg & Engrg Corp, 2 Park Ave, New York, N. Y.
Laclede-Christy Clay Products Co, 411 N 7th, St Louis, Mo.
McLeod & Henry Co Inc, 31 Monroe St, Troy, N. Y.
Plibrico Jointless Firebrick Co, 1818 Kingsbury, Chicago, Ill.
Ramtite Co, 2563 W 18th St, Chicago, Ill.
Reintjes, Geo P, Co, 2517 Jefferson, Kansas City, Mo.

WALLS, BOILER-FURNACE, WATER-COOLED

American Engrg Co, Aramingo Ave, Philadelphia, Pa.
Adv pages 12-13
Babcock & Wilcox Co, 85 Liberty St, New York, N. Y.
Adv pages 4-5
Bernitz Furnace Appliance Co, 89 Broad St, New York, N. Y.
Bigelow Co, 200-220 River St, New Haven, Conn.
Bigelow-Liptak Corp, 2840 W Grand Blvd, Detroit, Mich.
Combustion Engrg Co, Inc, 200 Madison Ave, New York, N. Y.
Adv pages 42-43
Edge Moor Iron Works, 30 Rockefeller Plaza, New York, N. Y.

Foster Wheeler Corp, 165 Broadway, New York, N. Y.
Adv pages 24-25
Keeler, E, Co, Williamsport, Pa.
Adv page 117
Kennedy-Van Saun Mfg & Engrg Corp, 2 Park Ave, New York, N. Y.
Plibrico Jointless Firebrick Co, 1818 Kingsbury, Chicago, Ill.
Riley Stoker Corp, 999 Neponset St, Worcester, Mass.
Adv pages 88-89
Springfield Boiler Co, 1903 E Capitol Ave, Springfield, Ill.
Union Iron Works, Erie, Pa.

WATER COLUMNS

Bordo, L J, Co, Glenside, Pa.
Crane Co, 836 S Michigan Ave, Chicago, Ill.
Adv page 113
Diamond Power Specialty Corp, Box 288, Detroit, Mich.
Adv pages 8-9
Ernst Water Column & Gage Co, Livingston, N. J.
Huyette, Paul B, Co, 403 N Broad St, Philadelphia, Pa.
Adv page 138
Jarecki Mfg Co, Erie, Pa.
Adv pages 242
Lunkenheimer Co, Box 360, Annex Station, Cincinnati, Ohio
Adv pages 14-15
Reliance Gauge Column Co, 5902 Carnegie Ave, Cleveland, Ohio
Adv pages 32-33
Schaub, Fred H, Engrg Co, 325 W Huron St, Chicago, Ill.
Strong, Carlisle & Hammond Co, 1392 W 3rd St, Cleveland, O.
Williams Gage Co, 1938 Penna. Ave, N S, Pittsburgh, Pa.
Adv page 219
Wright-Austin Co, Detroit, Mich.
Yarnall-Waring Co, Chestnut Hill, Philadelphia, Pa.
Adv pages 101, 178, 193, 218, 224

WATER-TEST KITS

(See Feedwater-Test Kits)

WATER TREATMENT, BOILER

Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
American Sand-Banum Co, Dept M P, 9 Rockefeller Plaza, New York, N. Y.
Adv page 144
American Well Works, 100 N Broadway, Aurora, Ill.
Arrow Boiler Compound Co, 21 S 3rd St, Dept 21 P, St Louis, Mo.
Betz, W H & L D, 234 W Wyoming Ave, Philadelphia, Pa.
Adv pages 178, 180, 197, 224
Chemical Solvent Co, P O Box 487, Birmingham, Ala.
Cochrane Corp, 3106 N 17th St, Philadelphia, Pa.
Adv pages 186, 192, 206, 214
Dearborn Chemical Co, 310 S Michigan Ave, Chicago, Ill.
E A Hamilton Co, 143 Peck Ave, Syracuse, N. Y.
Elgin Softener Corp, 55 North St, Elgin, Ill.
Feedwaters, Inc, 140 Cedar St, New York, N. Y.
Filtrators Co, 96 Liberty St, New York, N. Y.
Haering, D W, & Co, 2308 S Winchester, Chicago, Ill.
Hall Laboratories, Bowman Bldg, Pittsburgh, Pa.
Adv page 225
Metalene Chemical Co, Bedford, Ohio
Monsanto Chemical Co, St Louis.
National Aluminate Corp, 6222 W 66th Place, Chicago, Ill.
Adv page 105
Permutit Co, Dept A, 330 W 42nd St, New York, N. Y.
Adv page 138
Philadelphia Quartz Co, 121 S 3rd St, Philadelphia, Pa.
Warley, Thos C, & Co, 217 Bainbridge St, Phila, Pa.
Western Chemical Co, 714 Washington St, Kansas City, Mo.

WATER TREATMENT, CONDENSER, COOLING SUPPLY

Allis-Chalmers Mfg Co, Milwaukee, Wis.
Adv pages 11, 18-19, 107, 256
Betz, W H & L D, 234 W Wyoming Ave, Philadelphia, Pa.
Adv pages 178, 180, 197, 224
Chloramine Corp, 101 Park Ave, New York, N. Y.
Feedwaters, Inc, 140 Cedar St, New York, N. Y.
Hall Laboratories, Bowman Bldg, Pittsburgh, Pa.
Adv page 225
Monsanto Chemical Co, St Louis.
National Aluminate Corp, 6222 W 66th Place, Chicago, Ill.
Adv page 105
Oakite Products, Inc, 23 Thames St, New York, N. Y.
Proportioneers, Inc, 7 Codding St, Providence, R. I.
Wallace & Tiernan Co, Bellville, N. J.
Western Chemical Co, 714 Washington St, Kansas City, Mo.

WATER TREATMENT, MIXERS

Mixing Equipment Co, 1024 Garson Ave, Rochester, N. Y.
Adv page 224

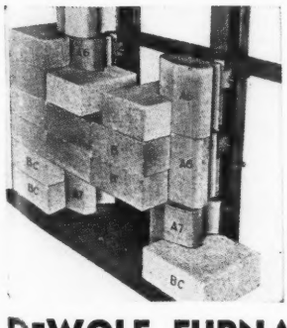
WATTHOUR METERS

General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
Sangamo Electric Co, Springfield, Ill.
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv pages 52-53

WELDING AND CUTTING OUTFITS, ACETYLENE

Air Reduction Sales Co, 60 E 42nd St, New York, N. Y.
Bastian-Blessing Co, E Ontario St, Chicago, Ill.
General Welding & Equipment Co, Cambridge, Mass.
Imperial Brass Mfg Co, Chicago, Ill.
Linde Air Products Co, 30 E 42nd St, New York, N. Y.
Adv pages 22-23
Smith Welding Equipt Corp, 2633 4th St, S E, Minneapolis, Minn.
Torchweld Equipment Div, National Cylinder Gas Co, 1035 West Lake St, Chicago, Ill.

DEWOLF STEEL STRUCTURE SECTIONALLY SUPPORTED



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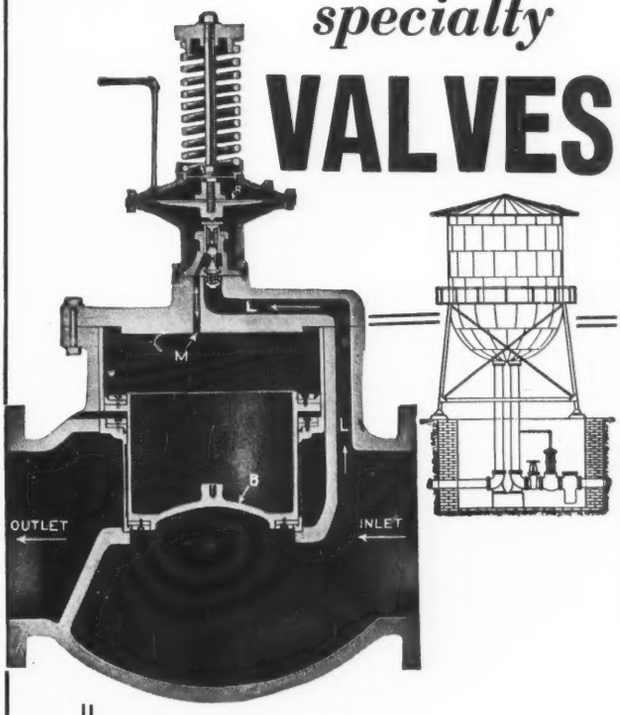
No metal embedded in the refractory. Expansion strains relieved without expansion joints. Air Cooled or Insulated construction for boiler furnaces, incinerators, heating furnaces, etc. Write for Bulletin.

DEWOLF FURNACE CORPORATION
77 South Ave. . . . Rochester, New York

Golden Anderson *specialty* VALVES



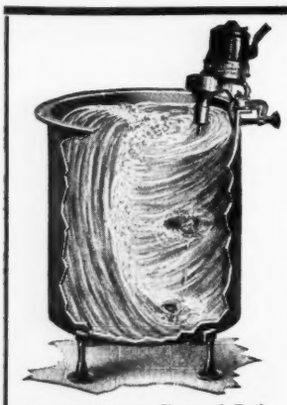
ALTITUDE CONTROL

• Hold efficiency at an even level by equipping your tank or standpipe with G-A Altitude control valves. You'll get a constant, automatic water level at all times, with no overflow. This valve is positive in action, with no water or hammer shock. Comes in sizes of 2" to 36", in either globe or angle pattern. Air and water cushioned, it also includes full bronze trim with no metal contacts. Write for your free copy of the G-A catalog . . . it completely describes the entire line.

also Emergency Throttle . . . Float Control . . . Pressure Reducing . . . Triple Acting Non-return . . . Check Valves . . . Etc.

GOLDEN ANDERSON
Valve Specialty Co.

FULTON BLDG., PITTSBURGH, PA.



For any Size or Shape of Tank. Send for Bulletin B-65

LIGHTNIN MIXERS

for all

Feed Water Treating

LIME — SODA-ASH — PHOSPHATE, ETC.

"LIGHTNIN" Mixers cost little—last for years. Specify for new equipment, use as replacement units on worn out mixing tanks. Used by National Aluminate Corp., Permutit and other national organizations. Makes your proportioning equipment work better.

MIXING EQUIPMENT COMPANY, INC.

1034 Garson Ave. Rochester, N. Y.

Direct or Gear Drive Portables. All Sizes. 1/8 to 10 H.P. Larger Units for Large Tanks.

West Lake St, Chicago, Ill.
Victor Equipment Co, 846 Folsom St, San Francisco, Calif.
Weldcraft Equipment Co, 2623 Liberty Ave, Pittsburgh, Pa.

WELDING MACHINES, ELECTRIC

Air Reduction Sales Co, 60 E 42nd St, New York, N. Y.
Allen Mfg & Welding Co, Inc, Buffalo, N. Y.
Burke Electric Co, Erie, Pa.
General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Harnischfeger Corp, Milwaukee, Wis.
Hobart Bros Co, Troy, Ohio
Lincoln Electric Co, 12818 Coit Rd, Cleveland, Ohio
Marquette Mfg Co, 409 Johnson St, N E, Minneapolis, Minn.
Smith Welding Equipt Corp, 2633 4th St, S E, Minneapolis.
Weldcraft Equipment Co, 2623 Liberty St, Pittsburgh, Pa.
Westinghouse Electric & Mfg Co, E Pittsburgh, Pa.
Adv page 52-53

WINCHES, ELECTRIC

American Engrg Co, Aramingo Ave, Philadelphia, Pa.
Adv pages 12-13
Bartlett & Snow, C O, Co, Cleveland, Ohio
Adv page 151
Bridgeport Chain & Mfg Co, Bridgeport, Conn.
Gifford-Wood Co, 24 Hill St, Hudson, N. Y.
Harrington Co, 17th & Callowhill Sts, Philadelphia, Pa.
Lidgerwood Mfg Co, Elizabeth, N. J.
Robins Conveying Belt Co, Passaic, N. J.
Shepard Niles Crane & Hoist Corp, 453 Schuyler Ave, Montour Falls, N. Y.
Stephens-Adamson Mfg Co, 5 Ridgeway Ave, Aurora, Ill.

WIRE AND CABLE, ELECTRIC

Adam, Frank, Electric Co, St. Louis, Mo.
American Steel & Wire Co, Rockefeller Bldg, Cleveland, Ohio
Anaconda Wire & Cable Co, 25 Broadway, New York, N. Y.
Bishop Wire & Cable Corp, 420 25th St, New York, N. Y.
Chase Brass & Copper Co, Waterbury, Conn.
General Cable Corp, 420 Lexington Ave, New York, N. Y.
General Electric Co, Schenectady, N. Y.
Adv pages 40-41, 121, 159, 226
Graybar Electric Co, 420 Lexington Ave, New York, N. Y.
Adv pages 171, 178, 186, 193, 207, 210, 215
National Electric Products Corp, Fulton Bldg, Pittsburgh, Pa.
Phelps Dodge Copper Products Corp, 40 Wall, New York, N. Y.
Roebling's, John A, Sons Co, 640 S Broad St, Trenton, N. J.
Adv page 145
Willard Storage Battery Co, 246 E 131st St, Cleveland, Ohio

WOOL, MINERAL, INSULATING

Baldwin-Hill Co, 575 Klagg Ave, Trenton, N. J.
Adv page 162, 167, 189
Barrett Co, 40 Rector St, New York, N. Y.
Carey, Philip, Co, Lockland, O.
Adv page Back Cover
Eagle-Picher Sales Co, P D 901, Temple Bar Bldg, Cincinnati, Ohio
Johns-Manville, 22 E 40th St, New York, N. Y.
Adv pages 36-37
Owens-Corning Fibreglas Corp, Toledo, Ohio
Refractory & Insulation Corp, 381 4th Ave, New York, N. Y.
Adv pages 189, 203
Standard Lime & Stone Co, 200 1st National Bank Bldg, Baltimore, Md.

CONSULTATION ON ALL WATER PROBLEMS

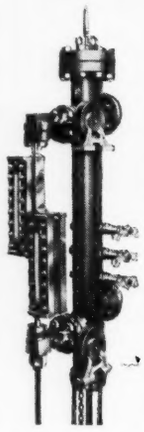
• WRITE FOR LITERATURE, INFORMATION OR SERVICE •

W. H. & L. D. BETZ, CHEMICAL ENGINEERS and Consultants on All Water Problems, 235 W. Wyoming Avenue, PHILADELPHIA 50 Church Street, NEW YORK • 37 W. Van Buren Street, CHICAGO 506 Dime Bank Bldg., DETROIT • 310 Thompson Bldg., TULSA Betz Laboratories Div., Wood Industries Ltd., Royal Bank Bldg., MONTREAL • 906 New Wellington Bldg., TORONTO

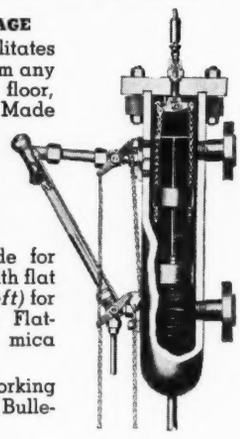
YARWAY WATER COLUMNS & GAGES

Widely used by public utilities, industrial plants and institutions. Sold as complete units or separate columns and gages.

Floatless Hi-Lo Alarm in column depends for action on displacement of balanced solid weights. Whenever high or low water level destroys balance of weights, valve in top of column opens, admitting steam to alarm whistle. Yarway Water Columns made for all pressures up to 1500 lbs.



SESURE-INCLINED GAGE
(shown at right) facilitates reading water level from any point on boiler room floor, even directly beneath. Made with round glass for pressures up to 400 lbs., with flat glass, pressures to 600 lbs.



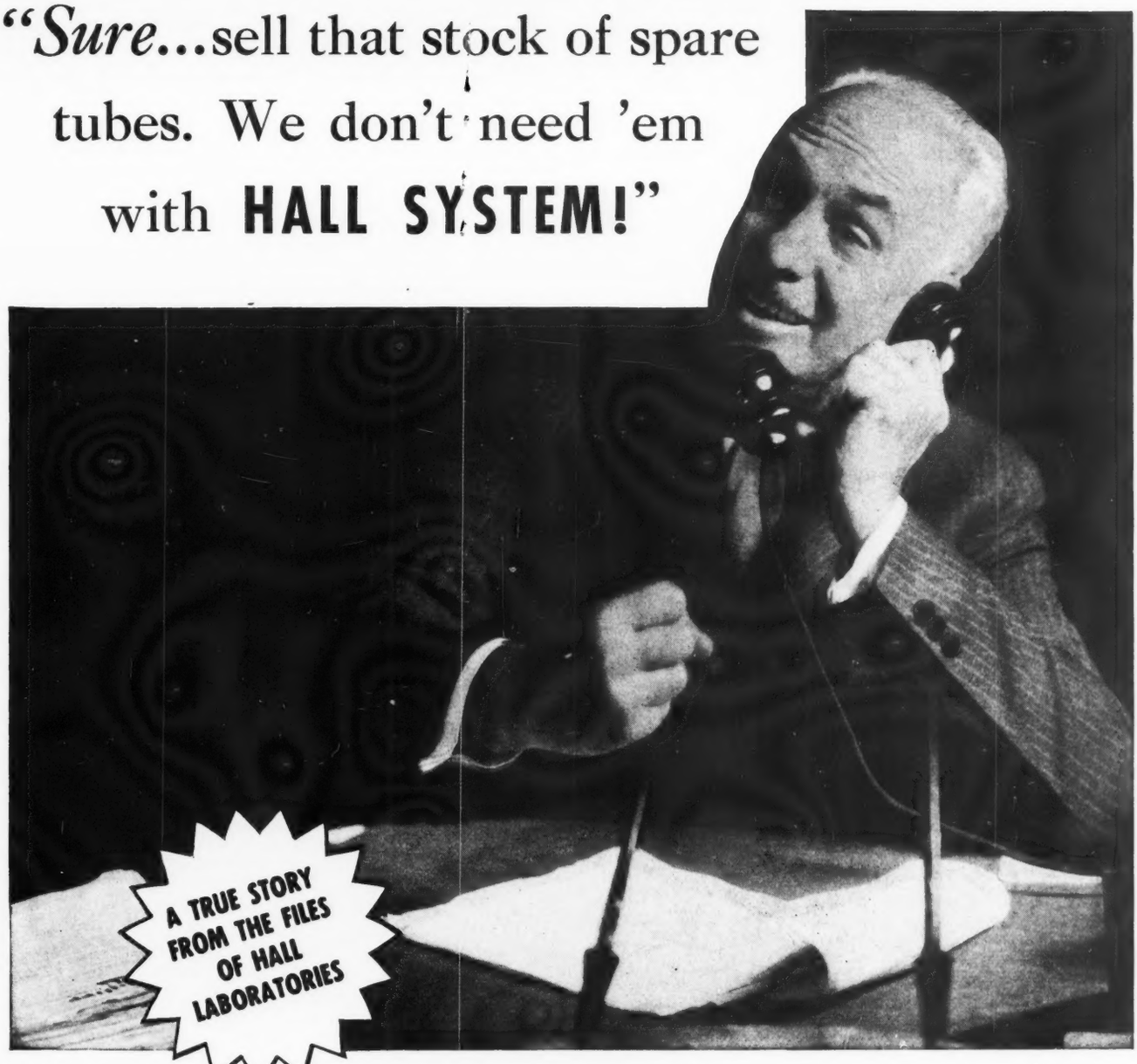
VERTICAL GAGES
with round glass made for pressures to 400 lbs., with flat glass *(illustrated at left)* for pressures to 1500 lbs. Flat-glass steel inserts are mica protected.

Send for celluloid working model and descriptive Bulletin WG-1808.

See other Yarway Advertisements on pages 101, 178, 193 and 218

YARNALL-WARING CO.
100 MERMAID AVE., PHILA.

"*Sure*...sell that stock of spare tubes. We don't need 'em with **HALL SYSTEM!**"



No longer need any power plant suffer unscheduled outages because of scale and corrosion

ONE spring several years ago a new 400-psi boiler was installed by an electric products manufacturer. Make-up was 100% hard water, through a lime-soda softener. The superintendent played along with a "cure-all" boiler compound all summer and fall. *But not one week of operation passed without tube failures taking the boiler off the line!* In December, 16 more tubes burned out in the bottom row. This was the final straw, and we were called in.

Exact control of the boiler water, with continuous maintenance of phosphate therein, was established by engineers of Hall Laboratories and taught to the operators, along with the most effective system for operating the softener. The boiler responded immediately. Continuous and economical operation followed and has continued throughout the intervening years.

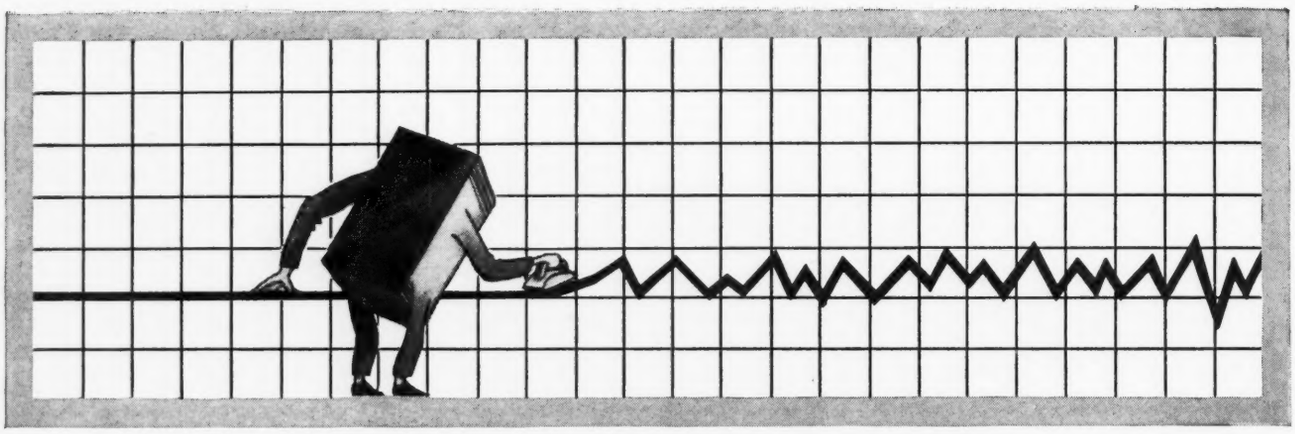
After two or three years of Hall Service, with not a single tube failure occurring, the superintendent sold the huge stock of spare tubes he had purchased during his early trouble.

Hall Service stops outages before they occur. With correct water conditioning, boilers stay clean and do not develop trouble from scale or corrosion even when operated at capacity continuously.

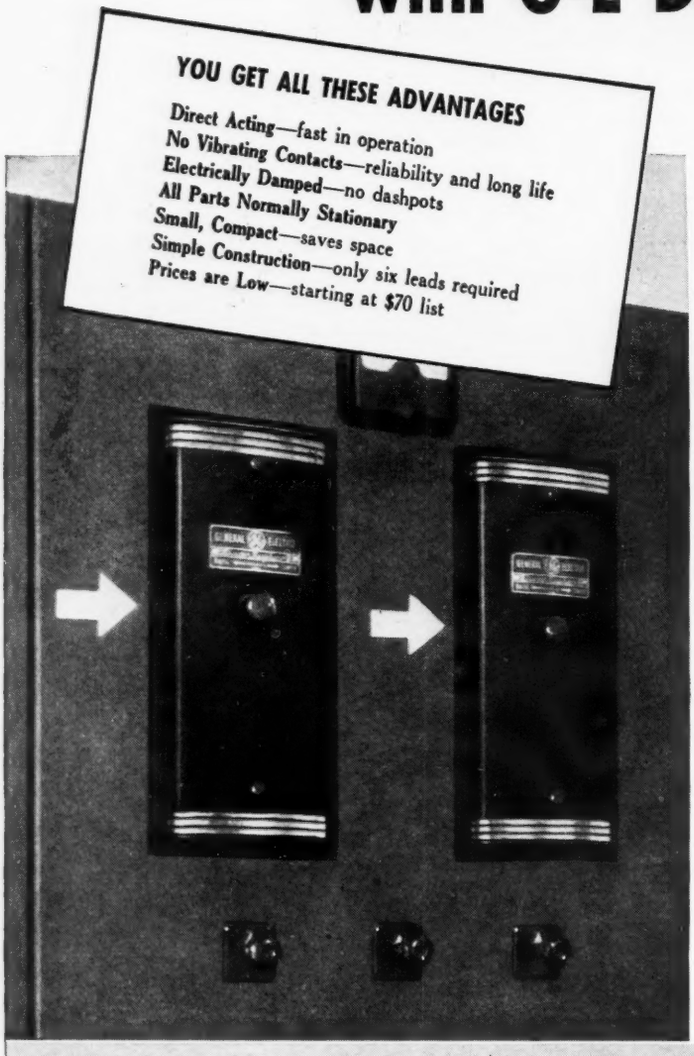
Write today, now, for a copy of our new booklet "17 Case Histories from the Files of Hall Laboratories." It shows how many widely differing boiler problems have been solved by the application of Hall System principles.

HALL LABORATORIES, INC. · 300 ROSS STREET · PITTSBURGH, PA.

HALL SYSTEM *of Boiler Water Conditioning*



Iron Out Your Voltage Bumps with G-E DIACTOR Regulators


YOU GET ALL THESE ADVANTAGES
Direct Acting—fast in operation
No Vibrating Contacts—reliability and long life
Electrically Damped—no dashpots
All Parts Normally Stationary
Small, Compact—saves space
Simple Construction—only six leads required
Prices are Low—starting at $70 list

VOLTAGE bumps and dips are "easy meat" for this little fellow. Once you put him on the job, you can be sure of a smooth voltage curve—he'll keep it that way.

Here's what he does: He holds the normal voltage close to the desired value without hunting or instability. After a change in operating conditions, he quickly returns the voltage to normal. And, because of the simple, reliable design, you are not troubled with bothersome, costly maintenance.

The G-E Diactor generator regulator has a quick-action, wide-range rheostatic element that provides an infinite number of smooth resistance steps from practically zero to the maximum.

What's YOUR Voltage Problem?

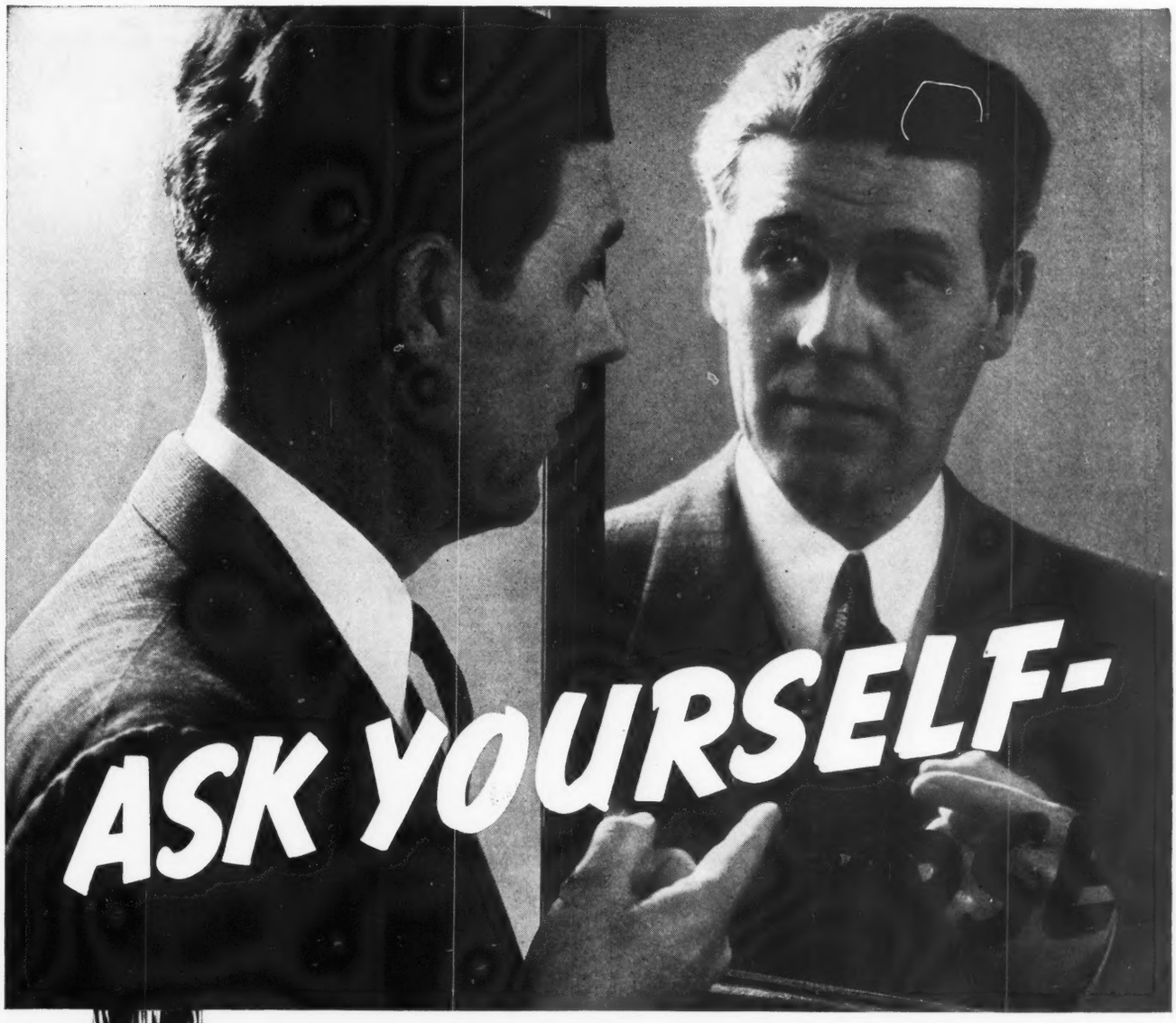
Do you have a generator voltage-regulation problem that involves a new installation? Are you replacing old regulating equipment? Do you have machines already in service that need some provision for adequate regulation? Whatever your requirements, there is a Diactor generator regulator exactly suited.

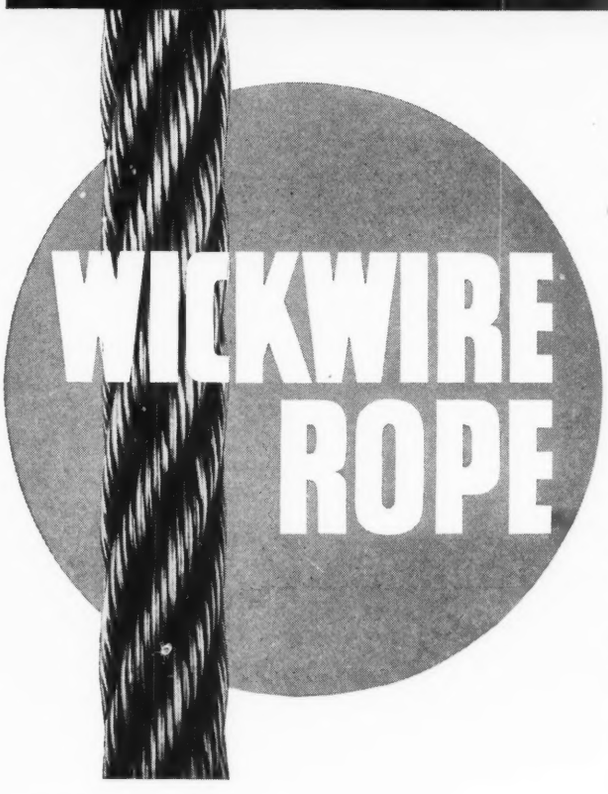
For complete information, just drop a note in the mail or call the G-E office near you. We'll be glad to send you Bulletin GEA-2022, or have a specialist call to discuss your voltage-regulation problems at your convenience. General Electric, Schenectady, N. Y.

Section of switchboard panel showing how well the modern streamlined Diactor regulator is adapted for semiflush mounting

GENERAL ELECTRIC

352-3





"Am I getting the lowest possible per-unit-of-use cost from my wire rope?"

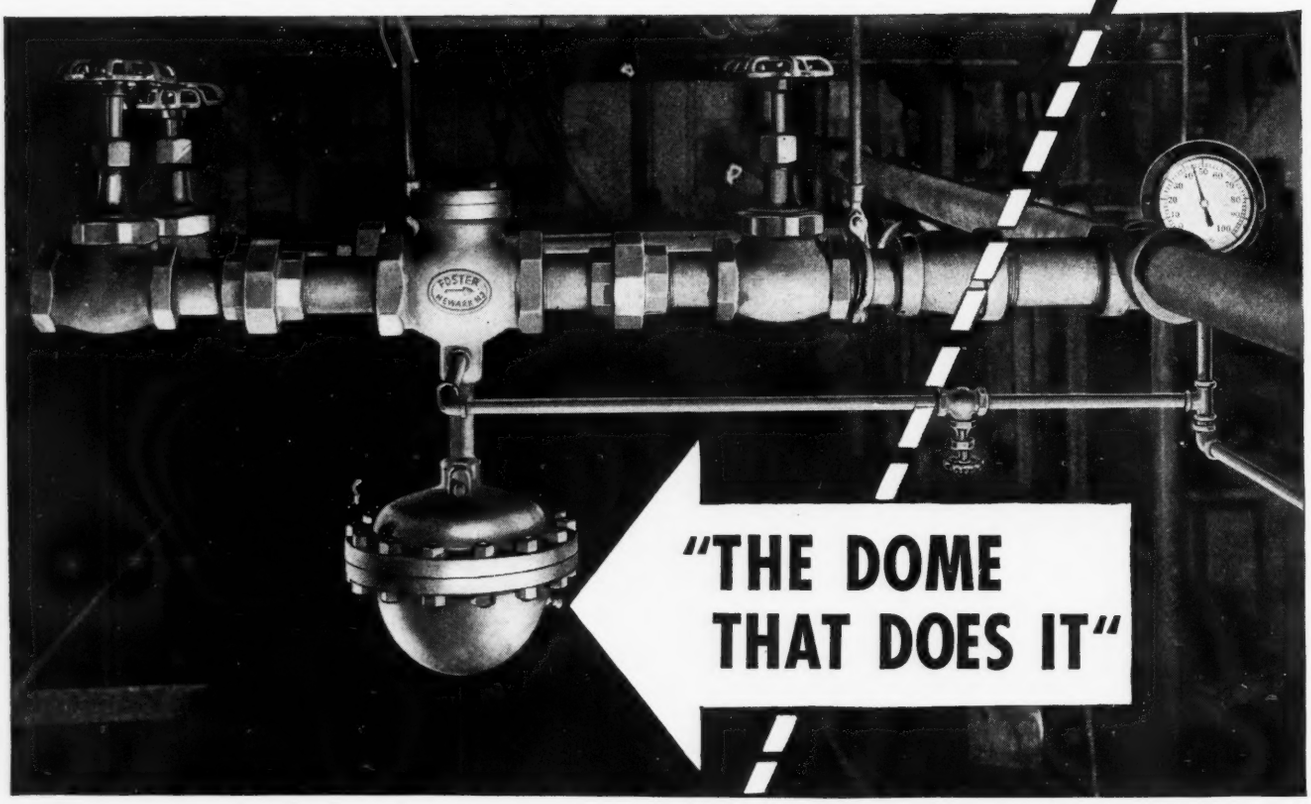
If you have not already tried Wickwire Rope, do so. The longer life of Wickwire Rope, far beyond that of rope built only to standard specifications, is showing rope users everywhere new "lows" in rope costs. If you are already using a Wickwire Rope, you are entitled to and should take advantage of Wickwire Spencer Engineering Service. Request a representative to verify the particular kind and lay of rope as best suited for your job. Send for a free copy of "Know Your Ropes" and put into practice its many money-saving hints in the care of rope in use.

Questioning yourself about rope costs may result in their material reduction. A Wickwire representative will gladly help you.

WICKWIRE SPENCER STEEL COMPANY

General Offices: 500 Fifth Avenue, New York City; Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City

If pressure regulation is your problem, investigate



Typical installation of a Foster Type 39-Q1 Pressure Reducing Regulator. The gauge at the right shows the delivery pressure; the small line in the foreground is the pilot line; the valves on both sides of the regulator are stop valves, while the by-pass and its single stop valve can be seen directly behind the main line.

This type is built for initial pressures up to 2500 pounds per square inch; for delivery pressures up to 1200 pounds per square inch; and for temperatures up to 1000 degrees Fahrenheit. In addition to this single-seated type, double seating is available in the Foster Type 39-Q2.

Are you interested in accurate, sensitive pressure regulation in a valve that is as simple to set as letting a few pounds of air in—or out—of an automobile tire?

Then you should investigate the new Foster Type 39-Q1 Pressure Reducing Regulator and its revolutionary design feature . . . the "dome that does it."

There are no springs, no weights in this simple regulator. A constant load on the valve is imposed by the air pressure in the dome . . . accuracy of regulation is unaffected by spring deflection and hystersis.

Adjustment? Simply change the dome load and you change the delivery pressure. A few strokes of a hand pump or a "shot" from a compressed gas bottle increases the delivery pressure . . . while opening the check valve in the dome decreases the delivery pressure.

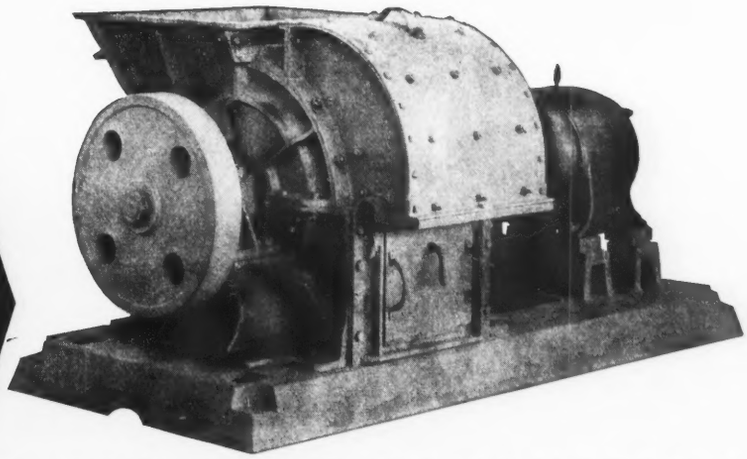
An eight page, fully illustrated bulletin containing complete information on this regulator is just off the press. A copy will be sent to you without cost or obligation . . . ask for Bulletin 10.

FOSTER ENGINEERING Company

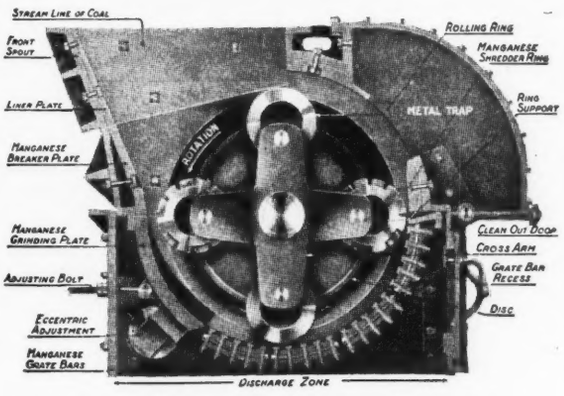
PRESSURE REGULATORS • RELIEF AND BACK PRESSURE VALVES • AUTOMATIC STOP AND CHECK VALVES • ALTITUDE VALVES • DAMPER REGULATORS • FAN ENGINE REGULATORS PUMP GOVERNORS • TEMPERATURE REGULATORS • LIQUID LEVEL CONTROLLERS • FLOAT AND LEVER BALANCED VALVES • NON-RETURN AND TRIPLE DUTY VALVES • VACUUM REGULATORS OR BREAKERS • SIGHT FLOW BOXES • STRAINERS • SAFETY VALVES

MONROE STREET • NEWARK, N. J.

AMERICAN RING CRUSHERS



SIZE COAL FOR EFFICIENT COMBUSTION



Cross-sectional view of American Ring Crusher

In American Crushers, Manganese Steel Rings apply centrifugal force to strike, roll and grind the coal during the crushing operation.

One of the Manganese Steel Shredder Rings, used in the "American" Crusher which splits the coal and prevents clogging. This is an exclusive "American" feature which eliminates the chance of crushing the coal and is largely responsible for the low cost crushing and exact sizing with the "AMERICAN."

Run-of-mine or lump coal reduced to proper size in one operation—at low cost

American Rolling Ring Crushers differ from other centrifugal crushers in that their housings are heavy steel castings, reinforced with ribs making them unbreakable from any crushing strain.

In operation, centrifugal force is applied at right angles to a horizontal shaft. Material to be crushed enters from the top, falls on the rotor and is struck by rings in suspension which shatter and distribute the coal before it reaches the breaker and grinding plate. By a simple adjustment of the patented grinding plate (made of manganese to insure long wear and sturdiness) coal can be sized to any requirements whether for stoker or pulverized fuel firing.

The average cost of coal crushing with the American is less than 1¢ per ton for all charges including maintenance, power, labor, depreciation and interest on the investment.

SPEED, CAPACITY, HORSEPOWER

No.	SPEED RPM	APPROX. H. P.	APPROXIMATE CAPACITIES 1½"	1¼"	1"	¾"	½"	SIZE LUMP R.O.M.
15S	600-720	20-25	80	50-65	45-50	35-40	25-30	10"
18S	600-720	25-30	90	70-80	60-65	50-55	40-45	12"
24S	600-720	30-40	150	130-140	100-120	80-100	60-70	18"
30S	600-720	50-60	225	175-200	150-170	130-150	80-100	20"
38S	600-720	60-75	300	225-250	200-235	175-200	125-150	24"
42S	600-720	75-100	350	300-325	285-325	275-300	175-200	28"
48S	600-720	100-125	400	350-375	330-350	300-325	225-250	28"
54S	600-720	125-150	450	390-420	360-380	325-340	250-275	28"
60S	600-720	150-175	500	425-450	400-425	350-375	275-300	28"

ASK FOR "AMERICAN" ASSISTANCE

Many leading power plants, by availing themselves of "American" engineering service and recommendations have improved combustion and reduced coal preparation costs. Call on us to analyze your problem and help you solve it.

AMERICAN PULVERIZER COMPANY
1349 Macklind Avenue
St. Louis, Missouri
ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS

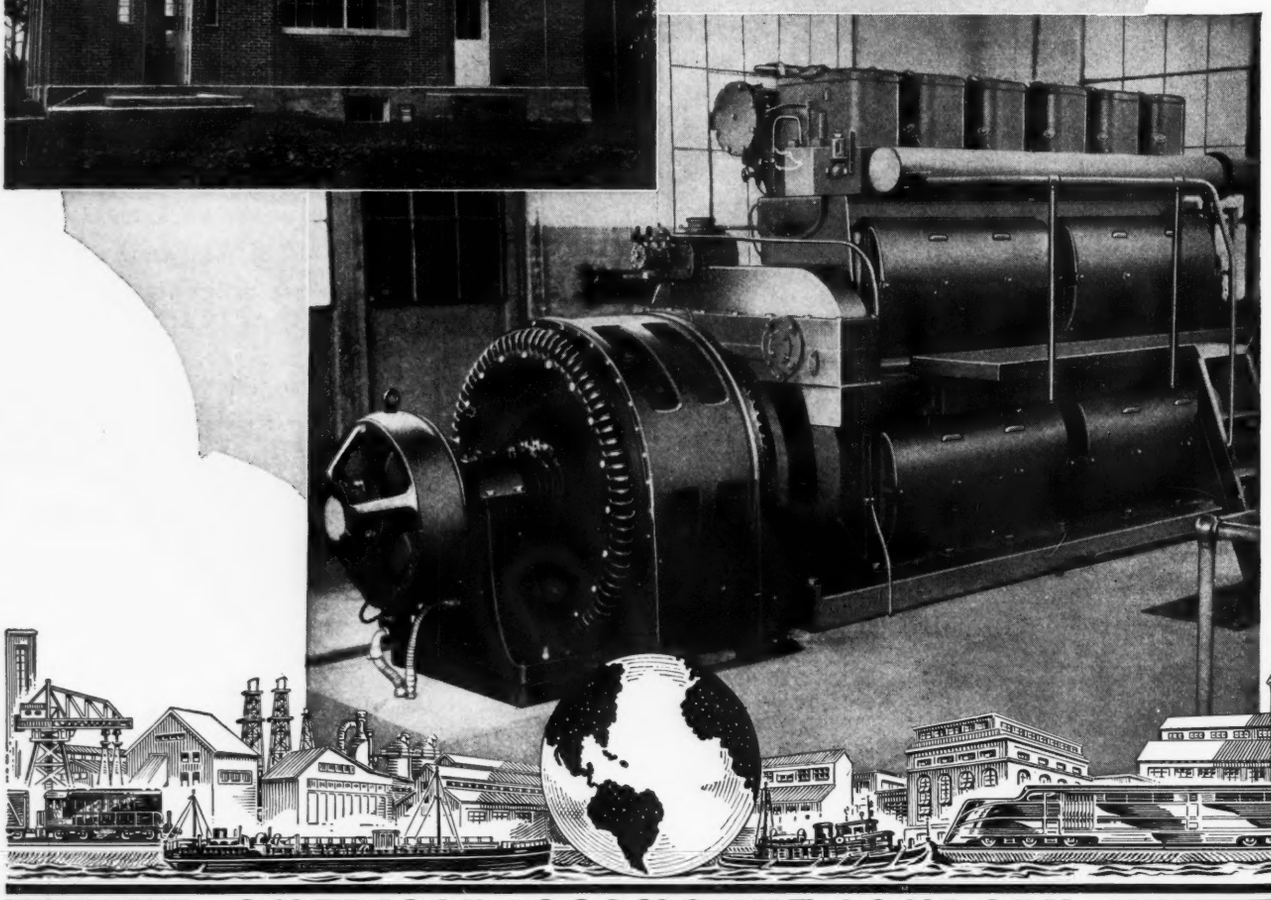
An ALCO DIESEL

For UNIVERSAL APPLICATION

The Municipal Diesel Light plant at Siloam Springs, Arkansas, already equipped with two McIntosh & Seymour Diesels, has recently added a six cylinder, 540 B. H. P., 600 R. P. M., 12½" x 13" Alco Diesel.

Reliability and continuity of operation are imperative in this service — naturally, therefore, the years of highly satisfactory experience with McIntosh & Seymour Diesels directed this purchase.

This Alco Diesel, due to its exceptional ruggedness, is eminently suitable for heavy duty services. It is in successful operation in Tankers, Tug Boats, Cutters, Hydraulic Dredges, Cargo Vessels, Public Utility and Municipal and Industrial Power Plants, Irrigation, Oil Pipe Lines, and Railway Motive Power.

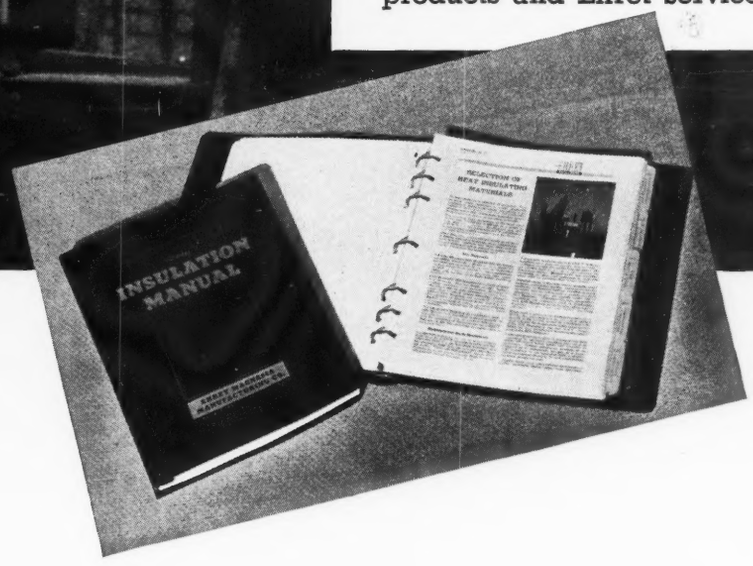


DIESEL ENGINE DIVISION **AMERICAN LOCOMOTIVE COMPANY** AUBURN, NEW YORK

In addition to pipe coverings and blocks of 85% Magnesia and Enduro high temperature insulation, there is an Ehret insulation to meet practically every power plant requirement.

Ehret's Durant Insulated Pipe units provide unusual advantages on underground steam service, and Valley Forge Packings are widely known for their quality performance.

The experience and help of the nationwide Ehret distributor and contractor organization is available to you. Write us today for full information on Ehret products and Ehret service to industry.



◀The new Ehret Insulation Manual is a practical handbook containing nearly 300 pages of information on the choice and application of insulations and other Ehret materials.

Copies are available to key personnel in the power plant field.

EHRET MAGNESIA MANUFACTURING COMPANY

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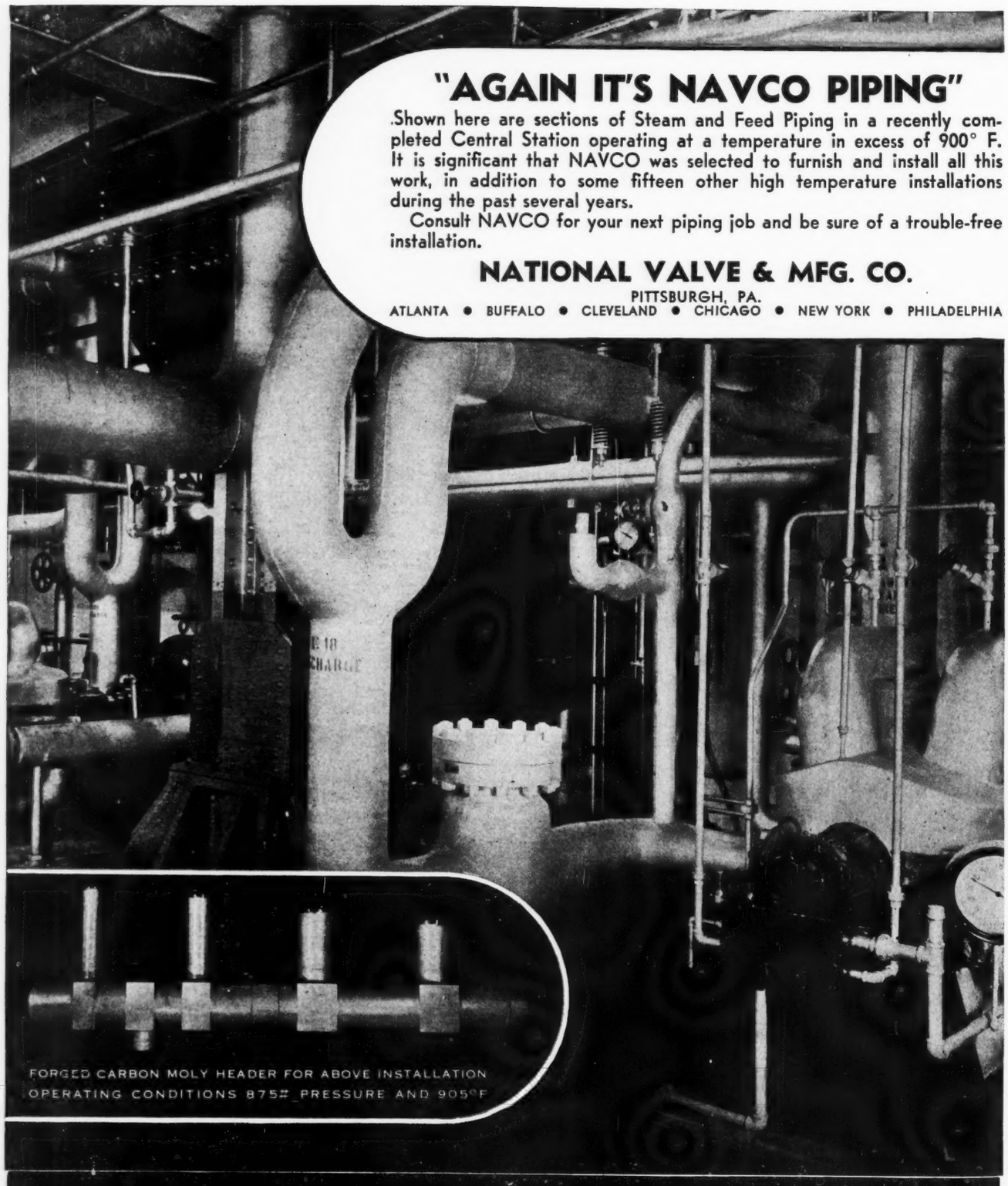

"AGAIN IT'S NAVCO PIPING"

Shown here are sections of Steam and Feed Piping in a recently completed Central Station operating at a temperature in excess of 900° F. It is significant that NAVCO was selected to furnish and install all this work, in addition to some fifteen other high temperature installations during the past several years.

Consult NAVCO for your next piping job and be sure of a trouble-free installation.

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PITTSBURGH, PA.

ATLANTA • BUFFALO • CLEVELAND • CHICAGO • NEW YORK • PHILADELPHIA

FORGED CARBON MOLY HEADER FOR ABOVE INSTALLATION
OPERATING CONDITIONS 875# PRESSURE AND 905°F

NAVCO PIPING

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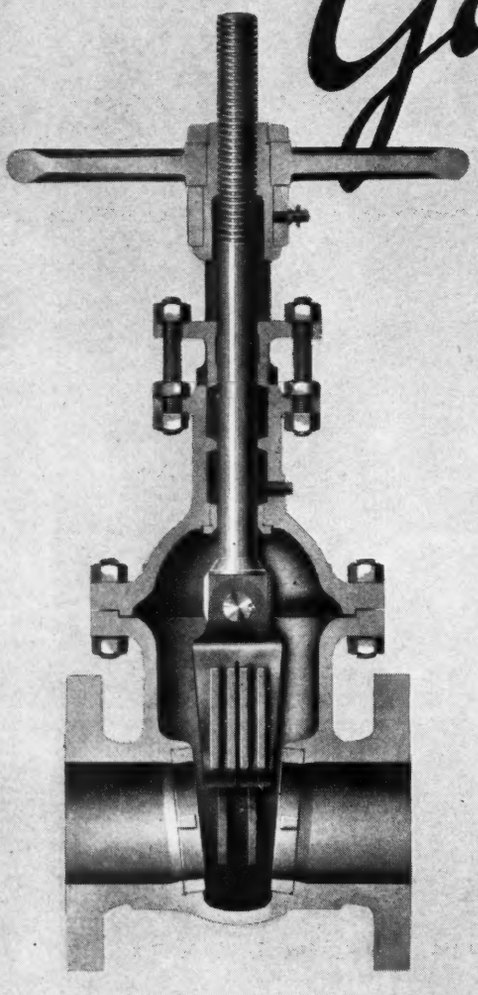
DARLING

Gate Valves



The INSIDE STORY *of superior valve design*

Darling Cast Steel Taper Seat Gate Valves embody simple design and rugged construction which makes Darling today's outstanding industrial valve.

It is made with an improved semi-split one-piece wedge to permit flexibility and provide tight seating at all times regardless of pressure and changing temperature conditions. The double grooves of the wedge engage twin guides on the valve body and provide extra large bearing area for the wedge.

The connection between the stem and wedge is positive and strong and assures accurate seating of the wedge without side strain.

Bodies and bonnets are made with ample thickness of metal to allow for erosion and corrosion.

Material and workmanship of these valves maintain the high standard which has characterized Darling products for over 50 years.

Darling Cast Steel Valves are offered in standard pressure ratings made of carbon or stainless steel, or other alloys with mountings to suit the service conditions.

The well-known Darling double revolving disc, parallel seat gate valve is also offered in cast steel.

SPECIAL ALLOYS FOR USE IN CHEMICAL AND ALLIED INDUSTRIES

Darling special alloy valves and special alloy mounted valves are well-known for their long and satisfactory service. These valves can be furnished in the different common alloys as well as in special alloys developed by Darling for unusual service conditions. To insure obtaining the best metal for your service conditions write giving full particulars including type of fluid or material handled, temperature, pressure and other pertinent data. Get in touch with the Darling representative on your next valve problem.

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DARLING

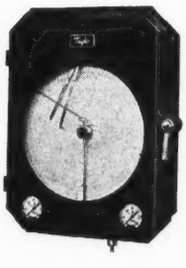
GATE VALVES AND FIRE HYDRANTS

You Can Get **Not 1 but 5 Forms of Control** in the **NEW TAYLOR FULSCOPE CONTROLLER**

THE NEW Taylor Fulscope Controller is unique. It can *grow* in your plant. It can grow as your processing needs grow. At first your processing needs may be simple, so you install the simplest form of the new Fulscope. As time goes on, perhaps your production expands, and your processing operations become more demanding. You need a different controller. What to do? Buy another instrument? You don't need to! Another unit assembly may be added to or substituted in your basic Fulscope Controller. That converts it into the controller your progressing needs require. You see, merely by adding or substituting such unit assemblies in the drilled and tapped Fulscope cases, it's possible to expand the Fulscope Controller to give all types of process control—from simple *fixed high sensitivity*, through *adjustable sensitivity, adjustable sensitivity with automatic reset*, to *adjustable sensitivity with Pre-Act*, (Taylor's amazing new control effect based on rate of control-point deviation) and *adjustable sensitivity with automatic reset and Pre-Act*, the ultimate in process control. You may never need such advanced control, but Taylor has it if you want it. The new Taylor Fulscope Controller is industry's 5-in-1 controller for *all* kinds of process control.

There's a national need today for this astonishingly versatile, adaptable Fulscope Controller. Industry's biggest job is helping America prepare fast. You must be prepared to produce top quality at top speed. With this new Taylor Fulscope Controller in your plant, you *are* prepared. No other process controller is so completely new—none has been so completely redesigned (not just tinkered with)—no other is so easily adaptable to growing, changing processing needs. Your own preparedness program can well begin with the new Taylor Fulscope Controller.

Ask the Taylor man what the 5-in-1 features of the new Fulscope mean specifically to *you*. Find out about the recording and indicating types—for temperature, pressure, flow, and liquid level. Learn about the new Taylor Recorder, twin of the Taylor Fulscope Controller. *Now*—from Taylor Instrument Companies, Rochester, N. Y. Plant also in Toronto, Canada.



Not 1, but all these 5 Forms of Control Available in the NEW TAYLOR FULSCOPE CONTROLLER

Fixed High Sensitivity—Adjustable Sensitivity—Adjustable Sensitivity with Automatic Reset (in same case)—Adjustable Sensitivity with Taylor's unique Pre-Act effect Adjustable Sensitivity with Automatic Reset and Pre-Act

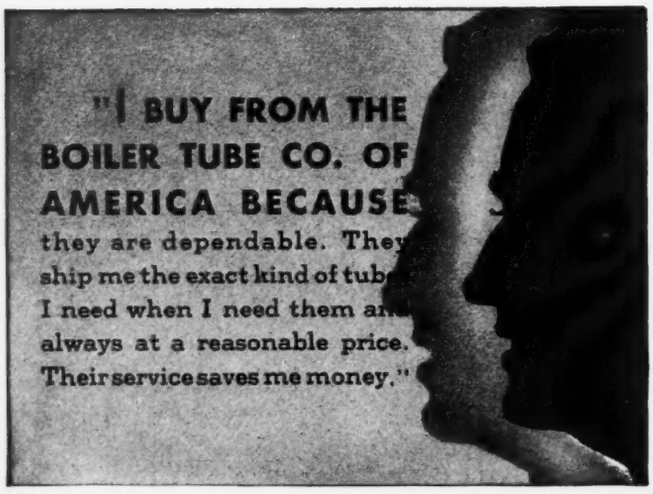
All Fulscope Controller cases are drilled and tapped to permit adding or substituting different forms of control—easily, right in the field!

BE PREPARED with TAYLOR INSTRUMENTS

Taylor

Indicating / Recording Controlling

TEMPERATURE, PRESSURE, FLOW *and* LEVEL INSTRUMENTS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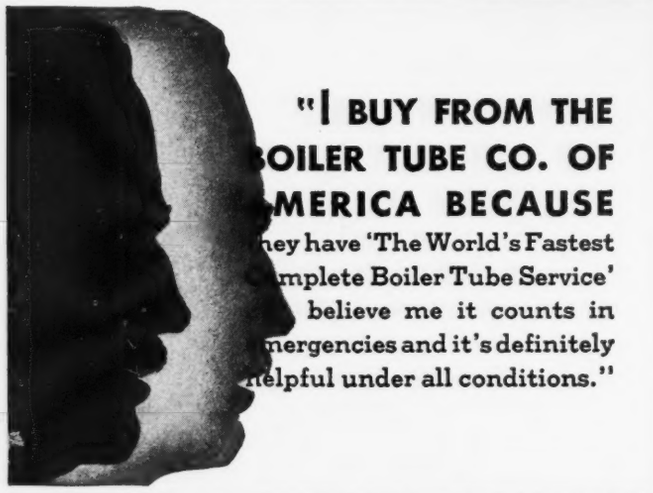
Their service saves me money."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believe me it counts in
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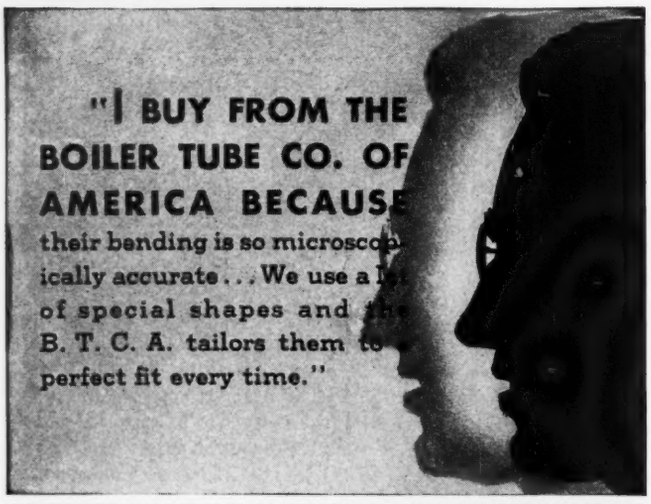
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their bending is so microsco
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of special shapes and th
B. T. C. A. tailors them to
perfect fit every time."

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NEW YORK PHILADELPHIA CHICAGO

New POWER SEAL
speeds up tube cleaning

Airetool's new series of power sealed motors emerged from careful experimentation and exacting tests under actual working conditions. Develops more power than any motor we have ever tested. Starts under heavy loads. Instant pick-up when air is applied. No dead centers. Constant torque at low speeds prevents stalling. Efficient operation at high speeds.

Airetool's New Series does not sacrifice the ruggedness or the simplicity of the previous Standard Series. Improvements are on the cylinder, rotor and rear head. No additional parts. No increase in air consumption.

More Cutter Head Combinations Possible

The new motors with their increased power now permit the use of a wider range of cutter head combinations. Such combinations will overcome extreme encrustations speedily and effectively, eliminating tube damage and metal removal.

WRITE TODAY

This New Series is designated as follows: "4000" Series for bent tubes, "5000" Series for straight tubes. Write for Bulletin DP.

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Representatives in Principal Cities
New York Address, 50 Church St.

12-inch Series 1500
MOTOR OPERATED CAST STEEL GATE VALVE

This valve, which was designed for 1500 pounds per square inch pressure at 950° Fahrenheit, weighs 7,100 pounds including the motor control. The pressure castings are of carbon molybdenum steel; wedge and seat are Stellite-faced; and the stem is made of 11½-13% chrome steel. It is one of a number manufactured by Walworth for a public utility power plant, and was exhibited at the Power Show, New York City, December 2nd to 7th, 1940. » » » Walworth Lubricated Plug Valves; Valves and Fittings of bronze, iron, and steel; Walseal Valves and Fittings; Genuine Stillson, Walco, and Parmelee pipe wrenches, and Hi-Test, C.N.I. and Ni-Resist cast pipes were also displayed. » » » Catalog 89, contains complete information regarding the full line of Walworth Valves, Fittings, Pipe and Tools. Write for your copy on your business letterhead.

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Backed by
98 Years' Service

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Dixon's Pipe Joint Graphite Compound—tightly seals all flanged, gasketed and threaded joints against steam, gas, air, acid, alkalies, brine, and all aqueous solvents. Enables easy disassembling of joints years later.

Dixon's Graphite Seal—performs same function as Dixon's Pipe Joint Graphite Compound, but is impervious to hot and cold oil, gasoline, and all non-aqueous solvents.

Dixon's Solid Belt Dressing—handy, giant bar held against running belt reduces slip, lengthens belt life, will not harden or crack belt even after years of use.

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Here's a new McGraw-Hill practical book to help you avoid pump breakdowns, pump inefficiency, pump expense, through better selection, operation, and maintenance of pumps for any purpose. Gives you a wealth of usable information on all types of pumps, regular and special, their performance, service limitations, how to make your specifications clear, how to install, operate, and maintain pumps, how to locate and remedy pump troubles, etc.

JUST OUT!

PUMPS

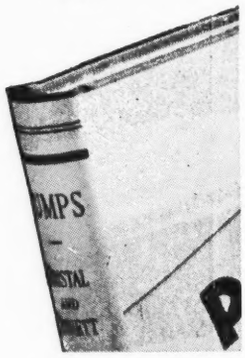
TYPES, SELECTION, INSTALLATION, OPERATION, and MAINTENANCE

By **Frank A. Kristal**
Weinman Pump Manufacturing Co.

and **F. A. Annett**
Associate Editor, *Power*

339 pages, 6 x 9,

385 illustrations, $3.50



THIS is a book for the pump user to consult in selecting and buying his pumps, for the manufacturer in insuring adequate fulfillment of specifications, for the operator in securing maximum efficiency and locating and remedying troubles quickly.

What makes a pump work? What type of pump is suitable for a specific task? How can you estimate the head against which a pump must work? For most economical pump operation, how do you calculate pipe sizes? What type piston, plunger, valve, roller, crescent, sliding vane, wabble plate, etc., etc. should be incorporated in the pump to best fit *your* needs? These questions, completely answered in Kristal and Annett's book, indicate the thorough and practical help it gives.

Complete data on:

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and many others

A special chapter shows in detail how to overcome one of the most important problems in pump efficiency and cost by showing how to estimate the head against which they must work and the size of suction and discharge pipes.

The A B C of Pumps

18 big chapters covering

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- **how to select and install them**
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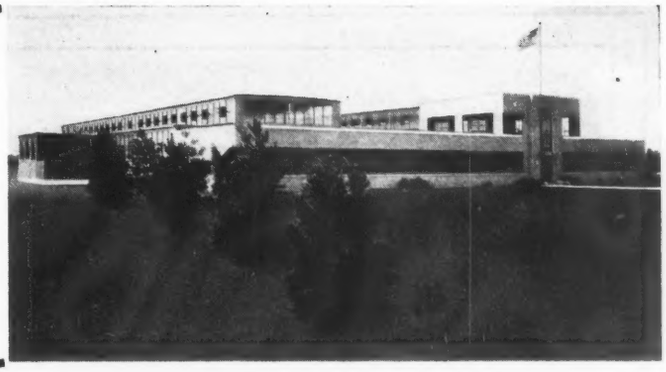

Oilbilt Offers Unequalled Simplicity, Speed and Low Cost of Installation— Plus a Thermal Efficiency of 80% or Better

Unusual Installation Advantages

1. Compact—Saves Space
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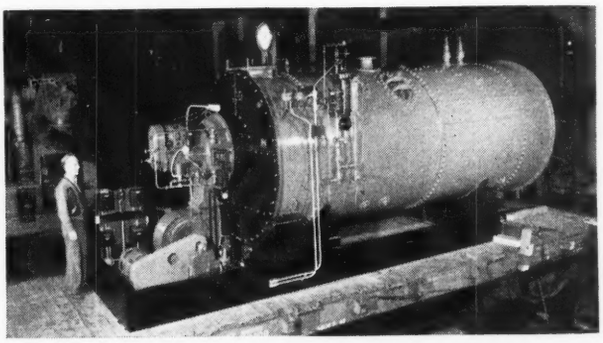

300 HP., 150 lbs. pressure, Oilbilt on a flatcar as shipped—no brick settings required—no stack—connection merely a piping job.

Portable unit built for American Volunteer Ambulance Corps —Sponsored by Dr. Alexis Carrel—provides steam for sterilization—heating—cooking—and hot water needs. 25 HP., 125 lbs. pressure, length 12 ft., height 7 ft., width 6 ft., weight 6000 lbs. Insulation and steel lagging. Injector. Condensate recovery system. Fuel oil, cold and hot water tanks. Wash bowl—hot water and oil.

The Oilbilt Steam Generating Plant is a product of advanced engineering design, careful construction and thorough testing.

—high thermal efficiency—80% guaranteed from 30% of rating to full rated capacity.

—compact design saves space. Only a minimum requirement for foundations, no costly heavy footings or settings.

—four pass, down-draft construction gets all possible heat from fuel.

—positive blower air supply eliminates high, costly stack.

—burner equipment, an integral part of the Oilbilt, available in two types for light or heavy fuel oil.

—performance tested, fully assembled, by the manufacturer.

—built by one company—one responsibility.

—modern controls eliminate full-time attention.

—built to A. S. M. E. Code as well as local or State Codes applying.

Light oil fired units 20 to 100 HP.
Heavy oil (No. 6) units 50 to 500 HP.
} 15 to 200 lbs. working pressure

Write for complete information.

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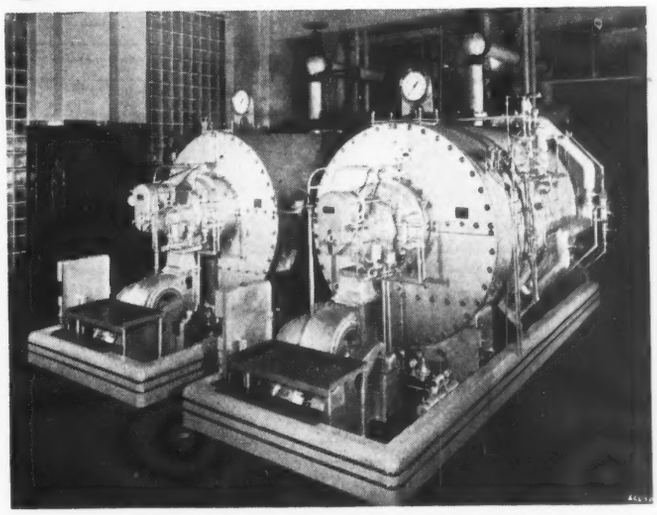
Oilbilt STEAM GENERATING PLANTS



Two 300 HP., 200 lbs. pressure, Oilbilts of the type supplied U. S. Naval Air Bases at KANEOHE, T. H., MIDWAY ISLAND, MIAMI, FLA., and other locations.

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TRICO visible automatic lubrication is the ultra-modern way to stop waste and failures caused by old-fashioned trust-to-luck hand oiling methods.
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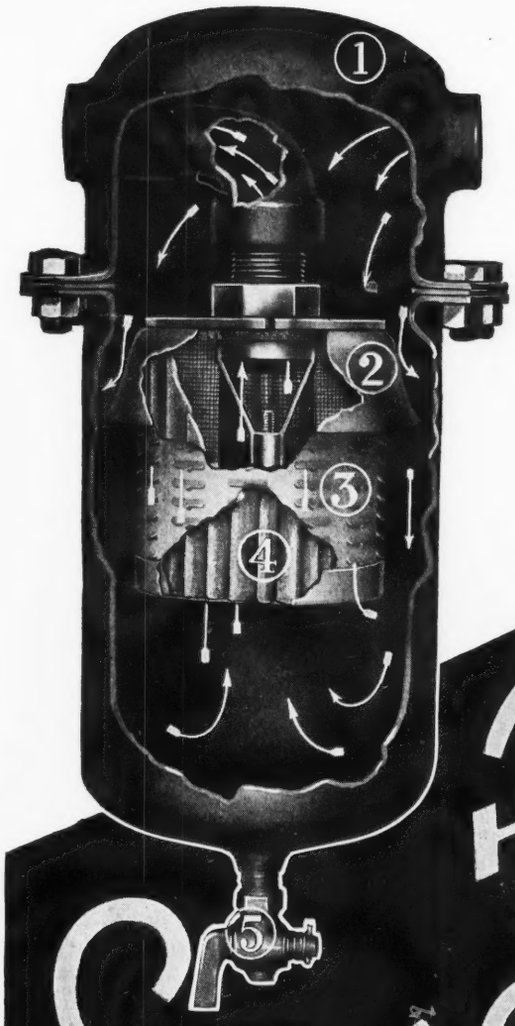
ENGINEERS — CONSTRUCTORS
New York, N. Y.

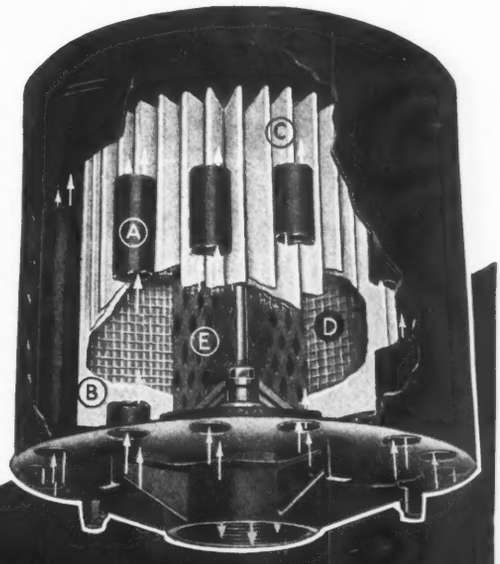


← MODEL CPH

For horizontal air transmission lines. Model CP for vertical lines. (1) container; (2) baffle; (3) housing; (4) insert; (5) drain cock.

MODEL DS →

Combination Silencer-filter for internal combustion engine and compressor intake. (A) Rectifying chamber (a series); (B) dry Feltex Filtering Medium; (C) Radial Fin Construction; (D) rigid, galvanized mesh frame; (E) reinforcing tube.



How to Save Money

WITH AIR FILTERS

» » » Check over the machinery and processes under your supervision. Are gasoline, gas or Diesel engines, compressors, blowers or electric motors operating without efficient air filters? Do air-powered tools run on unfiltered air? Are air-using processes lacking clean, dry air? Is intricate, expensive machinery unprotected from dust?

AIR FILTERS ARE ECONOMIZERS

In every case, correct air filter installations will reduce operating expenses and maintenance costs. The reasons are simple. Abrasive dust is everywhere. Unless kept out by efficient filters, it scours away cylinder walls, wears out reciprocating parts, clogs delicate machinery. Foreign matter in air transmission lines (pipe scale, rust, dirt, oil, and moisture) damages air-using tools; interferes with air-using processes. Facts and figures prove the savings made by high grade air filters. Use them everywhere and watch cost figures drop.

Protectomotor Air Filters More Than 99% Efficient

Tests made by the University of California prove that Protectomotors possess an efficiency only slightly less than absolute. This extraordinary performance is the result of several factors: (1) the patented Radial Fin Construction provides large filtering area in small space, minimum restriction of air flow; (2) the famous Feltex Filtering Medium is tough, long wearing, efficient in stopping the finest dust particles; (3) Protectomotors are built under the closest possible supervision from high quality, selected materials. You can SAVE MONEY using them—write for catalog and data.

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STAYNEW FILTER CORP., 23 LEIGHTON AVE., ROCHESTER, N. Y.

SAFER OPERATION *and* A SAVING

C-F "VIGILANT" Feed-Water REGULATOR

Better steam production is obtained from a boiler in which fluctuation of water level is prevented. This the "Vigilant" Feed Water Regulator will definitely accomplish. Not only lower fuel cost but safer operation results from this very simple precaution. The regulator is easily installed, automatic, unfailing. Ask for Bulletin 2514.

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ACCURATE CLEAN CUT THREADS

They take hold quickly, draw up tightly and thus speed the job and avoid leaks. Long a feature of JARECKI VALVES AND FITTINGS. Distributors in principal cities. . . . Jarecki Mfg. Co., Erie, Pa.

JARECKI VALVES & FITTINGS

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EXPANSION JOINTS, ALIGNMENT GUIDES, PIPE SUPPORTS, ANCHORS, MANHOLE FRAMES for UNDERGROUND or SURFACE PIPE LINE INSTALLATIONS

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Fairbanks Valves are made in globe, angle, gate, check and ball types—in both bronze and iron—for practically every steam, water, air, oil and acid condition, for pressures from 125 to 350 lbs.

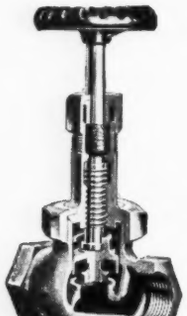

Fig. U-01, Bronze Globe Union Bonnet

Renewable composition disc. 150 lbs. steam working pressure. Also made in angle pattern. Sizes, ⅛ to 3 in.

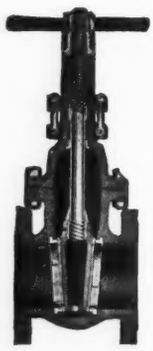

Fig. 0302, Iron Body Gate

Renewable seat rings, solid wedge pattern. Stationary spindle. 150 lbs. steam working pressure. Also made with screwed ends. Sizes, 2 to 16 in. Made in Standard, Heavy and Extra Heavy pattern.

Fig. 0501-P, Bronze Regrinding Globe

Plug type. Renewable nickel alloy seat and disc. 200 lbs. steam working pressure. Also made in angle pattern. Sizes ½ to 2 in.

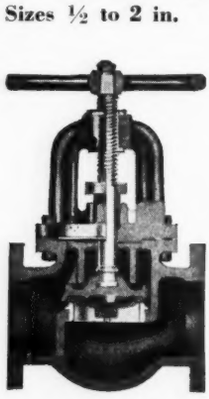

Fig. 0101, Iron Body Globe

Renewable composition or regrinding disc. 150 lbs. steam working pressure. Also made in angle type and in Heavy and Extra Heavy pattern. Sizes, 2 to 12 in.

Write for Catalog 21

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397 Lafayette St., New York, N. Y.
Factories: Binghamton, N. Y., Rome, Ga.

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By keeping abreast of the field's most up-to-date practices.

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2—560 HP. 2 cy. 4 cyl. 16x20, vert. eng.
A-1 condition, now in operation.
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Engine and Generator Unit
Late type used Skinner or Nordberg uniflow 200 K.W. 220 Volt 3 phase 60 cycle with accessories, right hand drive.
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WANTED BOILER
A 50 to 100 Horsepower ASME Code, scotch marine or firebox boiler or self contained type at least 100 lbs.
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1 DIESEL POWER PLANT
may be either 240, 300 or 360 hp—direct connected to generator (2300 v. 3 phase AC.)—complete with switch board, exciter, etc.
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Steam Turbine—Condensing.
1 or PAIR WANTED
1250 to 1500 HP—3600 RPM. Steam conditions not less than 250#—500° F.T.T. Specify full data, location and price.
Also wanted
3000 sq. ft. CONDENSER
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WANTED
Uniflow Generating Set
125 kva. 3 phase 220 volt uniflow generating set. State age, steam pressure and all particulars.
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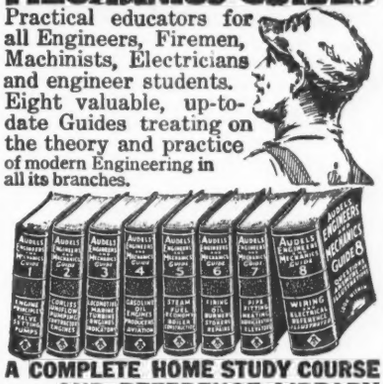
Practical educators for all Engineers, Firemen, Machinists, Electricians and engineer students. Eight valuable, up-to-date Guides treating on the theory and practice of modern Engineering in all its branches.



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1800 KW GENERAL ELECTRIC synchronous, 250 volts D.C., 13200/2200 volts A.C.; 600 RPM.

600 KW (2) GENERAL ELECTRIC synchronous, 125-250 volts 3-wire D.C. 4000/2300 volts A.C.; 900 RPM.

600 KW ALLIS CHALMERS synchronous, 250 volts D.C. 2300/600 volts A.C.; 900 RPM.

ROTARY CONVERTERS

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3500 KW GENERAL ELECTRIC, 225/285 volts D.C. 300 RPM. with 13200 volt transformer

2250 KW GENERAL ELECTRIC, 225/285 volts D.C. 450 RPM. with 13200 volt transformer

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ROTARY CONVERTERS

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5000 KVA GENERAL ELECTRIC condensing, 150-250 lbs. 550 deg. TT, with surface condenser; 2300 volts

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250 KVA GENERAL ELECTRIC non-condensing, 150-200 lbs. 500 deg. TT, 0-25 lbs. back pressure; 240 volts

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120 HP **Fairbanks Morse "VA" Belted Diesel.**

120 HP **Atlas** 6 cyl. **Diesel Power Unit.** A#1.

800 ft. **Ing. Rand Syn. Motor Driven Compressor.**

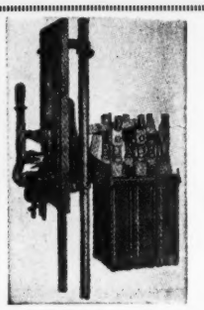
2700 ft. **Ing. Rand Syn. Motor Driven Compressor.**

250 KVA **Skinner Uniflow,** 2300 v. Very Modern.

450 KVA **Chuse Uniflow** 2300 v. Overhauled.

2—750 KW 250# 550 deg. **Westinghouse** 3/60/6600-2300 volt **Turbo Generators.** A#1.

Mississippi Valley Equipment Co.
507 Locust St. **St. Louis, Mo.**



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HP	*Volts*	*Make*	*Speed*
300	220-440	G.E.	600
300	2300-4000	G.E.	1200
200	2200-550	G.E.	1800
200	220-440	Whse.	514
200	440-220	G.E.	514
200	2200	G.E.	900
150	440-220	G.E.	1800
150	220-440	G.E.	720
150	2200-440	Whse.	1800
150	220-440	G.E.	600
125	220-440	G.E.	900
100	220-440	G.E.	720
100	2200-440-220	G.E.	600
100	220-440	G.E.	900
100	220-440	G.E.-MTC	900
80	220-440	G.E.-MTC	900
75	220-440	G.E.	900
60	220-440	G.E.	720

SYNCHRONOUS MOTORS 3-PH., 60-CY.

400	440-220	Whse.	276
350	440-220	G.E.	200
200	440-220	G.E.	720
200	2300-4000	G.E.	1200
60	2200-440-220	G.E.	1200
50	220-440	G.E.	1200

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3—100 kva., Wagner, 2300-230/460.
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HP	*Volts*	*Make*	*Type*	*Speed*
500	440-220	G.E.	IK	1200
500	440-220	G.E.	IK	900
400	2200	Whse.	C.S.	1800
300	2200	G.E.	IE-K	1200
300	2300-440	G.E.	IE-K	1200
150	2200	Allis Ch.	AN	450
150	440/220	Whse.	MS	900
100	440/550	G.E.	KT	1200
75	220-440	G.E.	KT	900
75	2200	G.E.	KT	900
75	220-440	G.E.	KT	1200
75	2300	G.E.	IE-K	1800
60	220-440	G.E.	KT	720
50	2200	G.E.	K	1200

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1—200 kw., 250 V., 1200 r.p.m., Ridgway, connected to 300 HP, 2200 V., 3 ph., 60 cy. syn. motor.

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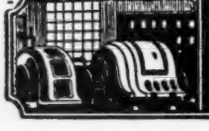
1—25 kw., 125 V., 1800 r.p.m., G.E., type RC, con. to KT 40 HP, 220/440 V. 3 ph. 60 cy. motor.



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Ready **NOW**...*for immediate shipment...*

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1—500-kw., 600-V., General Electric, synchronous.
2—500-kw., 250-V., General Electric, synchronous.
1—150-kw., 250-V., Westinghouse Synchronous.
2—100-kw., 125-V., G.E., Sq. Cage.
1—100-kw., 125-V., G.E., Synchronous.
1—100-kw., 250-V., Westinghouse Synchronous.
1— 75-kw., 125-V., Crocker-Wheeler Synchronous.
1— 75-kw., 250-V., G.E., Synchronous.
1— 50-kw., 125-V., G.E., Sq. Cage.
1— 50-kw., 250-V., G.E. Sq. Cage.
1— 40-kw., 125-V., Westinghouse Synchronous.
1— 35-kw., 125/250-V., G.E., Squirrel Cage.

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1—500-kw., G. E. 3 ph., 60 cy., 480 V. bleeder.
1—400-kw., General Electric, non-condensing.
1—300-kw., General Electric, condensing.
1—200-kw., General Electric, condensing.
1— 75-kw., 125 volt, Gen Elec. non-condensing.

TRANSFORMERS

9—400-kva., Wagner, 2400-240/480 volt.
1—400-kva., G.E. 2400/240-480 volts.
3—400-kva., Moloney, 2400/4150-440 volts.
3—300-kva., Pittsburgh, 4600/115/230 volts.
3—260-kva., G.E., 13800/460 volts
4—200-kva., Pittsburgh, 7800/220/110 volts.
6—150-kva., General Electric, 2200-220/440 volts.
2—150-kva., Westinghouse, 2300/230/115-V.
3—150-kva., G.E., 33,000/2300 volts.
3—150-kva., Pittsburgh, 6600/440 volts.
2—100-kva., General Electric 2200-220/440 volts.
5— 25-kva., West. Air Cooled, 440/220/220/110 V.
3— 25-kva., General Electric, 2300-230/460 volts.
1— 25-kva., G.E., 440/110-V.
6—100 kva., Wagner, 2400-120/240 V.
3—75-kva., Pittsburgh, 2400/120 V.
1— 25-kva., G.E., 220/220/110-V.
4— 21-kva., G.E., 440/110-V.
2— 50-kva., Kuhlman, 2200-110/220/440 volts.

3— 15-kva., G.E, 440/120-V.
1— 15-kva., West. Air Cooled, 220/440/220/110-V.

D.C. GENERATORS

1—100-kw., 600 r.p.m., 125/250-V., G.E.
2— 75-kw., 1200 r.p.m., 125-V., Crocker-Wheeler.
2— 75-kw., 550 r.p.m., 50-V., General Electric.

MOTORS—3 PHASE, 60 CYCLES

No.	H.P.	R.P.M.	Volts	Type
1	720	360	440	G.E. Syn.
1	500	450	2200/4000	G.E. Sl. Rg.
1	500	450	440	West. Sl. Rg.
1	400	514	440	West. Sl. Rg.
1	350	300	440	G.E. Sl. Rg.
1	350	100	220/440	G.E. Syn.
2	335	600	2300	G.E. Syn.
1	250	450	440	Elec. Machy. Syn.
1	250	400	440	G.E. Syn.
1	250	450	220	G.E. Sl. Rg.
1	225	900	4150	G.E. Syn.
1	200	600	440	G.E. Sq. Cg.
4	200	450	2200/4000	G.E. Sl. Rg.
2	200	514	2200/4000	G.E. Sl. Rg.
2	150	720	220	Elec. Machy. Syn.
1	150	1200	4150	Ideal, Syn.
1	150	600	2200	G.E. Sl. Rg.
2	150	1160	440	G.E. Sq. Cg.
1	150	1730	2200	G.E. Sq. Cg.
2	100	450	440	G.E. Sq. Cg.
1	100	720	440	West. Sl. Rg.
1	100	1800	440	Al.-Ch. Sq. Cg.

Variable Speed 230 Volt Motors

H.P.	R.P.M.	Type
1—150	300/900	Westinghouse
125	475/950	Westinghouse
100	475/1200	Electro Dyn.
90	470/940	G.E.
75	235/950	Burke
60	600/1200	G.E.
35	500/1500	G.E.
35	500/1250	G.E.
30	600/1200	West.
30	225/900	Cr. Wheeler
25	300/1200	G.E.
25	650/2200	Westinghouse
20	750/1500	G.E.
4— 20	300/1200	G.E.
2— 15	800/1200	G.E.

SPECIALS

2—150 KW, 250/125 volt, Westinghouse non-condensing turbo-generator sets.

1—500 KW, General Electric, MPC, 125/250 vclts, with 710 HP, 2300 volt, synchronous motor.

2—30 KW, 32 volt, Electric Products, M.G. sets practically new.

Diesel Electric Plant, 80 HP, Fairbanks-Morse, with 65 KVA, 300 RPM direct connected generator, starting and control equipment.

21 x 24 Ames Uniflow non-condensing, 200 RPM, with direct connected General Electric generator.

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1—1203 HP Edge Moor 325-lb. Stoker
4—1200 HP Stirling 250-lb. Gas or Stoker
1—1014 HP Stirling 275-lb. Stoker
3—1000 HP Bigelow Hornsby 225-lb.
1— 850 HP B. & W. 240-lb. Oil & Gas Burners
3— 814 HP Casey-Hedges 200-lb. Stokers
3— 752 HP Stirling 200-lb. Stokers
1— 550 HP Stirling 250-lb. Stoker
2— 520 HP Heine 200-lb. Hand fired
1— 500 HP Stirling 200-lb. Stoker
1— 484 HP Springfield 225-lb. Stoker
2— 404 HP Springfield 200-lb. Stokers
2— 400 HP Stirling 225-lb. Stokers
1— 325 HP Stirling 160-lb. Stoker
1— 300 HP Heine 160-lb. Stoker
2— 254 HP Stirling 180-lb. Stokers
2— 160 HP Stirling 155-lb. Hand fired

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1—5000 KVA West. 25/62½ cy. 750 RPM
1—3125 KVA West. 25/62½ cy. 750 RPM
2—3000 KVA West. 60/25 cy. 300 RPM
1—2500 KVA G. E. 25/62½ cy. 750 RPM
1—1800 KW G. E. 25/60 cy. 300 RPM
1—1250 KVA G. E. 25/62½ cy. 375 RPM
1— 750 KVA West. 60/25 cy. 300 RPM
1— 300 KW West. 25/62½ cy. 750 RPM

MOTOR GENERATOR SETS—60 Cy.

1—1500 KW General Electric 275 V.
1—1000 KW Allis-Chalmers 600 V.
2— 750 KW Westinghouse 250 V. 3-wire
1— 500 KW General Electric 700 V.
1— 500 KW Westinghouse 125/250 V.
1— 500 KW Allis-Chalmers 125 V.
2— 400 KW Allis-Chalmers 275 V.

ROTARY CONVERTERS—60 Cy.

1—3500 KW General Electric, 250 V.
2—1500 KW Westinghouse, 600 V.
1—1250 KW General Electric, 240 V.
2—1000 KW General Electric, 600 V.
1—1000 KW Westinghouse, 250 V.
1— 500 KW General Electric, 250 V.
1— 500 KW General Electric, 600 V.

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100 H.P. G.E. 900 RPM
100 H.P. Fairbanks Morse 720 RPM
100 H.P. Allis Chalmers 720 RPM
75 H.P. Westinghouse 1200 RPM
75 H.P. G.E. 900 RPM
75 H.P. Westinghouse 720 RPM
75 H.P. Allis Chalmers 600 RPM
60 H.P. Westinghouse 1200 RPM
60 H.P. General Electric 1200 RPM
60 H.P. General Electric 900 RPM
60 H.P. Allis Chalmers 600 RPM
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200 H. P. Allis Chal. 1200 RPM (2)
200 H.P. General Electric 600 RPM
150 H.P. Ridgway 600 RPM
125 H.P. Allis Chalmers 1200 RPM
100 H.P. G.E. 1200 RPM (2)
100 H.P. Allis Chal. 1200 RPM (3)
100 H.P. General Electric 900 RPM
100 H.P. Westinghouse 720 RPM
75 H.P. Westinghouse 1800 RPM
75 H.P. G.E. 1800 RPM (3)
75 H.P. G.E. 1800 RPM (3)
75 H.P. Westinghouse 1140 RPM
75 H.P. General Electric 900 RPM
75 H.P. Westinghouse 900 RPM
75 H.P. G.E. 720 RPM (3)
75 H.P. Allis Chalmers 600 RPM
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90 KVA Triumph 360 RPM
50 K.W. G.E. 1200 RPM (2)
50 K.W. Star 900 RPM
50 K.W. Star, 1200 RPM (2)
36 K.W. General Electric 900 RPM
30 KVA Crocker Wheeler 1200 RPM
15, 20, & 25 KVA 1200 RPM (8)

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500 K.W. G.E. (See Special)
150 K.W. Ridgway Synchronous mtr.
75 K.W. General Electric Syn. mtr.
45 K.W. Westinghouse 700 RPM
50 K.W. Burke 1200 RPM
35 K.W. Gen. Elec., 1750 RPM, Sq. Cg.
30 K.W. Star 1750 RPM

125 V. M.G. SETS

75 K.W. Crocker Wheeler
60 K.W. Westinghouse Syn. mtr.
50 K.W. Westinghouse
50 K.W. Crocker Wheeler
40 K.W. Westinghouse (2)

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75 H.P. Reliance 475/1050 RPM (2)
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50 H.P. G.E. CO, 725/1800 RPM (2)
30 H.P. G.E. 825/2000 RPM
30 H.P. G.E., CD, 500/1500 RPM
25 H.P. Westinghouse 600/1200 RPM
20 H.P. G.E., 300/1200 RPM
15 H.P. Westinghouse 825/1650 RPM
15 H.P. G.E. 600/1800 RPM
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115 VOLT D.C. MOTORS

90 H.P. General Electric 900 RPM
35 H.P. General Electric 1765 RPM
25 H.P. General Electric 1800 RPM
20 H.P. Crocker Wheeler 1750 RPM
20 H.P. Crock. Wh. vert. 1750 RPM
15 H.P. Eck 1500/1800 RPM
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7½ H.P. General Electric 1700 RPM

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1—1000 KW G.E. 275v. 3 U Consists of 2—500 KW 275v. Gen. d.c. to 1400 hp. 2300/6600v. Syn. Mot.
1—1000 KW G.E. 600V. Gen. to 1400 HP 6600/2200V.
1—750 KW Whse. 275 V. Gen. to 1100 HP 2300V. mo.
1—750 KW G.E. 600v. Gen. d.c. to 1100 hp. 2200/4400v. Syn. Mo.
1—500 KW G.E. 600V. Gen. to 700 HP 13200V. mot.
1—400 KW. Cr. Wh., 125/250v. 3U, (2—150 KW, 125v, dc to 435 hp. Syn.)
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3- 300	G.E.	H-RP	2400-120/240
1- 300	Whse.	3-2 SK	2300-2300
3- 300	Pitts.	1 OISC	4660/2300x230/115
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HP	Make	Volts	Speed
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2-1250	Whse.	500	300
1-1200	G.E.	600	650
1-1200	G.E.	550	450
1- 800	Whse.	550	200/300
1- 350	G.E.	550	650
2- 300	Whse.	500	250/400
3- 130	Cr. Wh.	550	1200

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300 KW WESTINGHOUSE SYN. 250 V. Generator, 2300/4000 V. 3 Ph. 60 Cy. 80% P.F. 1200 RPM Motor. Manual Switchgear.

200 KW GENERAL ELECTRIC SYN. 500 V. MPC Generator, 2300/4000 V. 3 Ph. 60 Cy. ATI. 80% P.F., 1200 RPM Motor. Manual Switchgear.

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1—200 KW. West. 250/275 V. D.C. 2200 V. 1200 rpm. A.C. M.G.
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1—150 KW. Ridgway 250 V. D.C. 2200 V. A.C. M.G.
1—100 KW. West. 250 V. D.C. 2200 V. A.C. M.G.
1— 40 KW. West. 250 V. D.C. 220 or 440 V. A.C. M.G.

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3—219 KVA. G.E. Buckeye DIESEL 2300 V. A.C. (Can be reconnected for 440 or 220 V.)
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150 KVA. G.E. 2300 V. 3/60 600 rpm.
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1—100 KVA. West. 6600-220/110/1/60
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Turbo Generators and Transformers

2000 KW, 3 ph., 60 cy., 2300 V. **Gen. Elec. Turbo Generator** with 4350 ft. surface condenser, rado-jet, etc.

3—750 KW, 3 ph., 60 cy., 2300 V. **Allis-Chalmers Turbo Generators** with surface condensers.

Just purchased 10,000 KVA in 2300x115/230 volt **Transformers**, 5 to 100 KVA, standard makes.

This is just a partial list of our immense stock. We carry a large stock of all kinds of electrical power equipment.

What have you for sale?

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AIR COMPRESSOR

1—15" & 9¼"x12" Ingersoll-Rand Air Compressor, type XRE, 2-stage, 676 CFM., 5-step unloader direct driven by 125 HP. Syn. Motor of 3/60/440 V. 277 Rev., with control, exciter and air receiver 4'x8'. Fine condition.

TURBINES

2—100 HP. Westinghouse Steam Turbines, 900 Rev. with extended base for direct connection to pump or generator. In very good condition.

Marr-Galbreath Machinery Co.
52 Water Street Pittsburgh, Pa.

AIR COMPRESSOR

1722 cu. ft. Chicago Type OCE 2-stage Direct Connected 225 h.p. G.E. **Synchronous Motor** 3/60/2300. 3 Step Control. Still on foundations in Phila. Can be seen running till Dec. 1st.

DIESEL GENERATOR SET

12½ k.v.a El. Mchy. Co. Generator 3/60/220/900 r.p.m. direct connected exciter, direct connected to 18 h.p. Lister Heavy Duty 2-cyl. Diesel Engine, 4-cycle, all on c. i. base. Includes all accessories.

THE O'BRIEN MACHINERY CO.
OFFICE: 115 N. THIRD ST., PHILA., PA.

CENTRIFUGAL AIR COMPRESSORS

3—250 C.F.M. Allen & Billmyre Co. 2.25 lbs. pressure. Direct connected to 7½ H.P. 3 ph., 60 cy., 3600 RPM Motors.

FIRST CLASS CONDITION

McBride and McClennen trading as

DELTA EQUIPMENT CO.
148 N. 3d St. Phila., Pa.

PUMPS

50 HP Westinghouse CW Slipring 60 Cycle, 3 Phase, 220/440 Volt, 900 RPM Vertical.

30 HP Westinghouse CW Slipring 60 Cycle, 3 Phase, 220/440 Volt, 900 RPM Vertical.

FREQUENCY CHANGER

125 KW G. E. ITT 565 60 Cy 3 ph 240 Volts driven by 100 HP G. E. KT 559 25 Cycle 3 phase 220 Volts, 750 RPM.

Factory built set ready for delivery.

A. C. ALTERNATORS

2—100 KW General Electric, ATB, 60 Cycle, 3 Phase, 2200/440/220 Volt, 900 RPM, bases and pulleys.

75 KVA Allis-Chalmers 60/3/220/440/1200 direct connected exciter.

1—200 KW West., 25 Cycle, 500 RPM, 3 phase, 2200/4400 Volts.

MOTORS

3 PHASE—60 CYCLE 220/440 VOLT

15	Westgh.	1750	CS
75	G.E.	1200	1-K
100	G.E.	1800	1-K
200	G.E.	720	1-K

READY TO SHIP TRANSFORMERS

3—100 KVA G.E., 60 Cycle, 4600/230/460.

6—200 KVA G.E., 60 Cycle, Volts 4600/230/460.

3—75 KVA West., SK, 4600/230/460.

SPECIAL

2—260 HP, G.E. Synchronous Motors. 60 cycle, 3 phase, 550 Volts, 1200 RPM, Serial number over 4 million, with direct connected exciters.

SPECIAL MOTOR

300 H.P. G.E. Slipring, 25 cycle, 3 phase, 2200 volts, 500 RPM. 3 bearing. Complete with controls.

PLATING GENERATORS

D. C. VARIABLE SPEED MOTORS

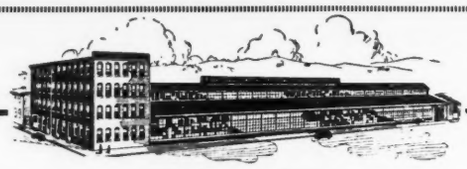
SLIPRING MOTORS

60 CYCLE, 3 PHASE, 220/440 VOLTS

ROTARY CONVERTERS

WRITE FOR STOCK LIST OF 25 CYCLE MOTORS

ERIE ELECTRIC CO., Inc.
124 Church St., Buffalo, N. Y.



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120,000 SQ. FT. OF WAREHOUSE SPACE . . .

. . . Housing our Complete Rebuilding Facilities . . . Also a wide range of Electric Motors and Power Plant Equipment

HERE'S A PARTIAL LIST OF PRODUCTS WE HAVE AVAILABYE FOR *IMMEDIATE SHIPMENT—A COMPLETE, DETAILED* LIST MAY BE FOUND IN OUR CATALOG NO. 53 *—WRITE FOR IT!*

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6—10 KW Master, New, 120/208 volt, 3 phase, 60 cycles, 1200 RPM, type AG, frame 365, 11.1 KVA, ball bearing with direct connected exciter.

DIRECT CURRENT ENGINE GENERATOR SETS—250 VOLTS

2—300 KW Elliott (Ridgway), 165 RPM, Nos. 4496-4497, direct connected to 480 HP Eliott (Ridgway), 21x28 four-valve engines, Nos. 4355-4356, like new.

MOTOR GENERATOR SETS

2—100 KW General Electric, 125 volts, D.C., 1200 RPM, type CD145A, direct connected to 150 HP General Electric Synchronous Motor, 1200 RPM, 220 volts, 3 phase, 60 cycles, type ATI, 98% P.F.

ROTARY CONVERTERS

1—200 KW General Electric, 600 volts, 6 phase, 60 cycle, 1200 RPM, type "HCC", No. 1506096.

2—500 KW General Electric, 600 volts, 6 phase, 60 cycle, 1200 RPM, Nos. 3889115 and 6.

DIRECT CURRENT ENGINE GENERATOR SETS

2—100 KW Allis-Chalmers, 120/240 volts, 225 RPM, 3 wire generators Nos. 104374 and 104381, connected to 14½x16" Fleming Harrisburg, 4 valve engines Nos. 4613 and 4615.

SYNCHRONOUS MOTORS

3—275 HP General Electric, 440 volts, 3 phase, 60 cycle, 600 RPM, 70% P.F., type ATI, with 6 KW, DC Exciters, 3 bearings, Nos. above 4 million.

1—700 HP General Electric, 2200/4160 volts, 3 phase, 60 cycle, 514 RPM, type TS, frame 7659, with DC Exciter, two bearings, #4018300.

THE GLOW ELECTRIC COMPANY

945 HARRIET ST. Phone MA. 3024 CINCINNATI, OHIO

BOILERS

1—600 H.P. (3) drum, low head, coal and oil fired.
4—600 H.P. B&W, V.H., (6) retort stokers.
3—550 H.P. Stirling, (6) retort stokers.
2—490 H.P. Stirling's, chain grate stokers.
1—500 H.P. Stirling, oil fired.
2—420 Stirling's, pulverized coal.
2—420 Stirling's, (5) retort stokers.
1—311 Stirling, chain grate stoker.
1—480 Springfield, (5) retort stoker.
2—415 Springfields, oil fired.
6—350 Babcock & Wilcox, oil fired.
1—290 Babcock & Wilcox, steel encased.
3—187 Babcock & Wilcox, hand fired.
4—250 return tubular, suspended, 150#.

All above boilers have numerous extra equipment.

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Power & Dist. Transf. From One to 5000 KVA. Any Volt, or Frequency.

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Reconditioned Motors, Generators, Control Equipment, etc.

Send for 32 page stock list.

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Specialists on Rebuilding Motors, Generators and Controls

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"Preparedness", as we currently think of it, means readiness for defense.

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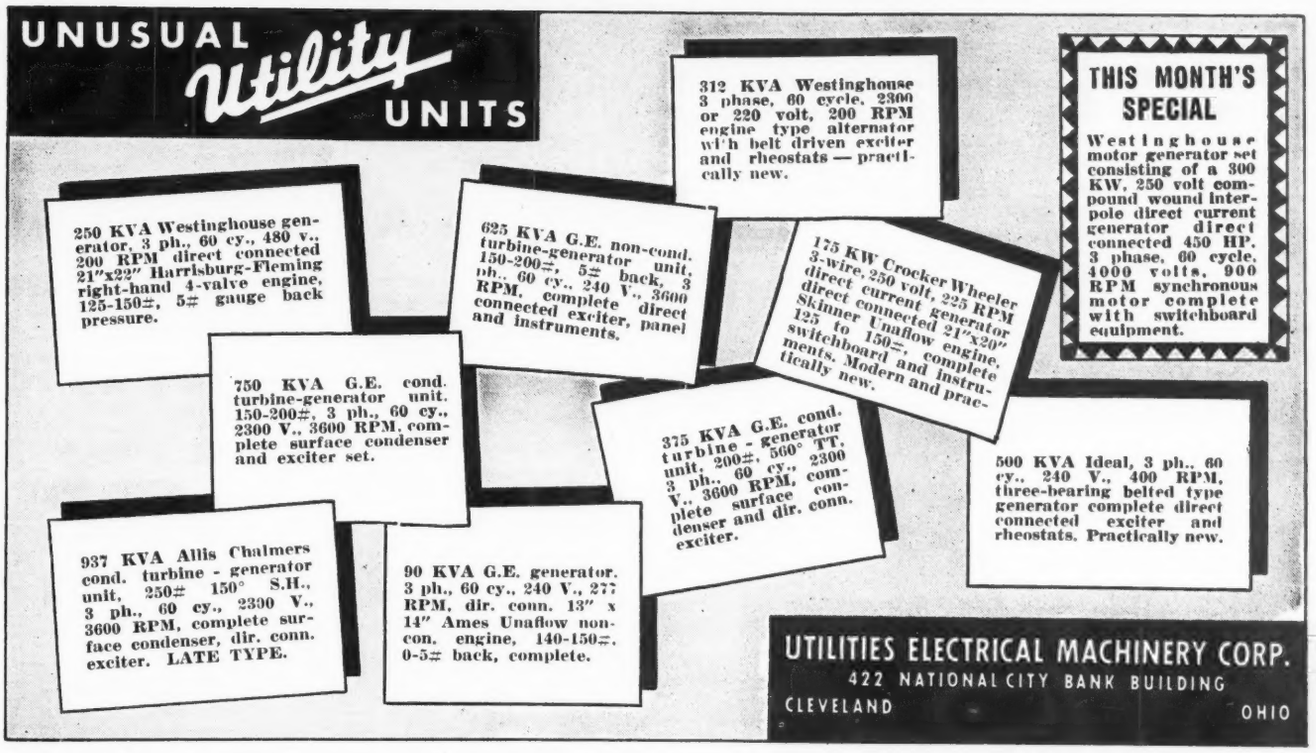
"Preparedness" to meet equipment needs is reflected in the advertising of Used Power Equipment in the Searchlight Section of this issue. Make it a habit to check these pages when you have urgent temporary or permanent equipment needs.

Departmental Advertising Staff

POWER


UNUSUAL Utility UNITS
250 KVA Westinghouse generator, 3 ph., 60 cy., 480 v., 200 RPM direct connected 21"x22" Harrisburg-Fleming right-hand 4-valve engine, 125-150#, 5# gauge back pressure.
312 KVA Westinghouse 3 phase, 60 cycle, 2300 or 220 volt, 200 RPM engine type alternator with belt driven exciter and rheostats — practically new.
625 KVA G.E. non-cond. turbine-generator unit, 150-200#, 5# back, 3 ph., 60 cy., 240 V., 3600 RPM, complete direct connected exciter, panel and instruments.
175 KW Crocker Wheeler 3-wire, 250 volt, 225 RPM direct current generator direct connected 21"x20" Skinner Unaflow engine, 125 to 150#, complete switchboard and instruments. Modern and practically new.
THIS MONTH'S SPECIAL
Westinghouse motor generator set consisting of a 300 KW, 250 volt compound wound interpole direct current generator direct connected 450 HP, 3 phase, 60 cycle, 4000 volts, 900 RPM synchronous motor complete with switchboard equipment.
750 KVA G.E. cond. turbine-generator unit, 150-200#, 3 ph., 60 cy., 2300 V., 3600 RPM, complete surface condenser and exciter set.
375 KVA G.E. cond. turbine - generator unit, 200#, 560° TT, 3 ph., 60 cy., 2300 V., 3600 RPM, complete surface condeuser and dir. conn. exciter.
500 KVA Ideal, 3 ph., 60 cy., 240 V., 400 RPM, three-bearing belted type generator complete direct connected exciter and rheostats. Practically new.
937 KVA Allis Chalmers cond. turbine - generator unit, 250# 150° S.H., 3 ph., 60 cy., 2300 V., 3600 RPM, complete surface condenser, dir. conn. exciter. LATE TYPE.
90 KVA G.E. generator. 3 ph., 60 cy., 240 V., 277 RPM, dir. conn. 13" x 14" Ames Unaflow noncon. engine, 140-150#, 0-5# back, complete.
UTILITIES ELECTRICAL MACHINERY CORP.
422 NATIONAL CITY BANK BUILDING
CLEVELAND OHIO

COMPLETE POWER PLANT

4—750 HP. Kidwell Water Tube Boilers
2—1500 KW. 2300 Volt, Allis-Chalmers Turbo-Generators, with Jet Condensers
1—750 KW. 2300 Volt. Allis-Chalmers Turbo-Generator, Mixed Pressure Machine, Condenser

ELECTRIC EQUIPMENT

1—75 KW. G.E. 250 Volt Generator, 110 HP. 2200 Volt motor
1—20 KW. G.E. 60 Volt Generator 30 HP. 440 Volt Motor
9—300 HP. G.E. HITC. 550 volt, 600 R.P.M. 60 Cycle Motors
4—200 HP. G.E. HITC. 550 Volt, 600 R.P.M. 60 Cycle Motors
15—75 HP. G.E. HITC, 550 Volt, 600 R.P.M. 60 Cycle Motors
4—30 HP. G.E. 2200 Volt, 1200 R.P.M. 60 Cycle Motors
6—25 HP. G.E. 220 Volt, 1200 R.P.M. 60 Cycle Motors
17—500 KVA G.E. 22000/600 Volt, 3 Phase, Transformers

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FEED WATER METERING HEATER

1—Used **COCHRANE Feed Water Metering Heater.** Capacity 1500 Horsepower. Perfect condition. **Price $500.**

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NEW TAYLOR STOKER

Four retort Taylor Stoker steam turbine drive, will produce 1000 boiler horsepower, never used at less than half the new cost.

FS-96, Power
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2—Iron Fireman Stokers. Model 4A-CD-L. Complete with automatic control.

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LET'S SHOW YOU THESE UNITS

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300 KW G. E. 3-unit 125/250 Volt D. C.
200 KW Allis-Chalmers 125/250 Volt converter.
150 KW Burke 250 Volt D. C.
100 KW Ridgway 250 Volt D. C.
75 KW G. E. 125 Volt D. C.
50 KW Imperial 250 Volt D. C.
50 KW G. E. 250 Volt D. C.
25 KW G. E. 250 Volt D. C.
15 KW Imperial 125 Volt D. C.
10 KW Electric Machinery 125 Volt D. C.

FREQUENCY CHANGERS 60-25 Cycle

G. E. 600 KW 750 RPM.
G. E. 200 KW 750 RPM.

SYNCHRONOUS MOTORS 3 Phase 60 Cycle

Burke 300 HP 900 RPM 440/220 Volt.
G. E. 200 HP 720 RPM 440/220 Volt.
G. E. 125 HP 277 RPM 440/220 Volt.
West. 100 HP 900 RPM 2200 Volt.
C. W. 100 HP 900 RPM 440/220 Volt.
G. E. 75 HP 720 RPM 440/220 Volt.

SLIP RING MOTORS 3 Phase 60 Cycle

G. E. 400 HP 450 RPM 2200/440/220 Volt.
Allis-Chal. 250 HP 600 RPM 440/220 Volt.
Burke 100 HP 1200 RPM 440/220 Volt.
G. E. 60 HP 600 RPM 440/220 Volt.

ADJUSTABLE SPEED D. C. 230 Volt

G. E. 350 HP 600/900 RPM.
Burke 125 HP 600/1200 RPM.
West. 100 HP 600/1200 RPM.
G. E. 45/90 HP 475/950 RPM.
West. 45/90 HP 475/950 RPM.
G. E. 50/60 HP 600/1800 RPM.
4—Allis-Chal. 35/70 HP 450/1350 RPM.
Ridgway 25/35 HP 400/1600 RPM.
G. E. 25 HP 500/1500 RPM.
G. E. 20/25 HP 500/1500 RPM.
G. E. 20/30 HP 500/1500 RPM.
2—G. E. 15/20 HP 400/1600 RPM.

The Electric Motor and Repair Co.
CUYAHOGA FALLS, OHIO

Generator

One Westinghouse A.C. Generator, 250 K.W., 220 Volts, 568 Amps., 3 phase, 60 cycle, 257 R.P.M., Serial #693083 with one Outboard Bearing Pedestal and one coupling for inside connection. Also, G.E. Exciter.

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ALTERNATOR (Ideal) Fly Wheel type 125 K.V.A. 100 K.W. 60 cycle, 3 phase, 220 volt, 360 R.P.M. with belted exciter.
GENERATOR engine type (Ideal) D.C. 50 K.W. 250 volt, 360 R.P.M.
STORAGE Battery Philco glass jar 113 cell 600 ampere hrs. type 15 F.P.G. including steel rack and 15 K.W. Booster Unit.

GREENPOINT TRADING CORP.
160 No. 4th St. Brooklyn, N. Y.

FOR SALE BY OWNER

1—15,000 KW, 13,200 volts, G. E. condensing & Bleeding turbo in excellent condition with condensers and all accessories.
1—2500 KVA Westinghouse Turbo Generator 480 volts complete with condensers and all accessories.

TRANSFORMERS

1—15,000 KVA, 3 phase, 26,400/13,200/4600/2300 volts, oil cooled.
2—10,000 KVA, 3 phase, 26,400/13,200/4600/2300 volts, oil cooled.

CIRCUIT BREAKERS—OIL & AIR

500—Various Circuit Breakers up to 4,000 amps. including Relays; Current & Potential Transformers — Solenoid & Hand operated.
10—B13 & F33-600 amps. 15,000 volts steel case oil circuit breakers, relays, current transformers mounted — Sol. and man. oper.
300—Dry type Transformers, G. E. M. T. Q. phase changing type up to 100 KVA. Westinghouse ditto.

Also Gen. Elec. & Westinghouse voltage changing Transformers 110/220/96/48/32/26 volts.

REGULATORS

2—456 KVA—3 phase
8—286 KVA—single phase
6— 96 KVA—single phase
1— 10 KVA—3 phase

All of these are motor operated, have line drop compensators, contact making volt meters, and auxiliary switches. All modern stock, Serial numbers around 4,000,000.

OIL COOLED TRANSFORMERS

9—1000 KVA. 6—750 KVA; down to 333-250-100-50 and 25 KVA.

BARGAIN

6—100 KVA Pittsburgh — 2300/220-110 — $125. each.

Full stock of oil and air circuit breakers up to 4,000 amps., solenoid and hand operated.

BOILERS

10—600 HP B&W Boilers, superheaters, stokers, etc.

Over 1,000 Relays of all types for all services for circuit breakers, motors, tripping etc.—both G. E. and West.

What have you for sale? Single Units. A complete plant? We will buy it and you will profit. Get in touch with HOWE BROTHERS.

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Established 38 years
324-328 Pearl Street, New York City
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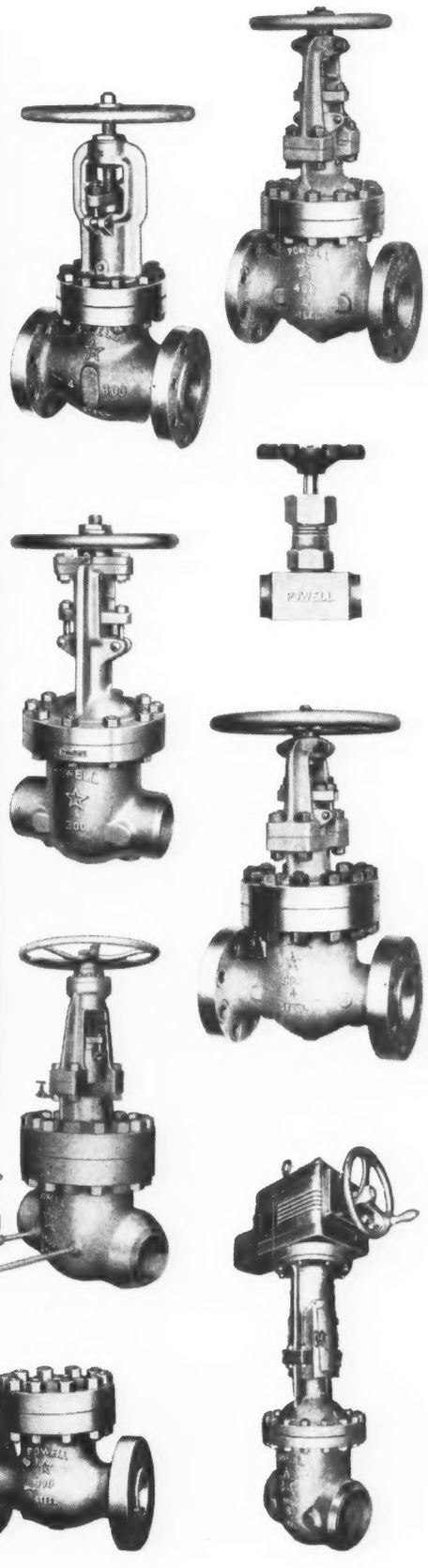

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Here Are Engineering Advancements That Mean More Gallons... At Less Cost to You!

1. **All-in-One ... Motor and Pump Designed as Unit on One Shaft and One Housing ... Increases Compactness ... Adds to Flexibility.**
2. **Allis-Chalmers Lo-Maintenance Motor ... Developed Especially for This Work ... Gives Maximum Pumping Efficiency at Lowest Power Cost ... Built with Cast Iron Frame for Special Applications in Chemical Industry.**
3. **Splash-Proof Features ... with Air Passages Baffled ... Safeguard Motor from Liquids.**
4. **Fewer Parts to Wear ... Better Fit to Parts Because of Fewer Machine Joints ... Adds to Long-Life, Low-Cost Operation.**
5. **Indestructible Rotor ... Distortionless Stator ... Bronze Fitted Pump Parts ... Large Space Provided for Adjusting Glands ... and Other Features Assure Improved Performance.**
6. **Greater Stability and Rigidity of All-In-One Design ... Means Less Vibration ... Lower Maintenance ... Longer Life.**

YOUR DOLLARS go farther when you buy the new Allis-Chalmers Splash-Proof Electrifugal Pump Unit ... with all its *extra-value* features that give you *more* gallons at *no extra cost!*

But we want you to be your own judge. That's why we say — "Take a look at the new Allis-Chalmers Electrifugal Pump!"

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Then look at the price! You'll be amazed to learn that this new Allis-Chalmers Electrifugal Pump ... with all its engineering advancements ... actually costs you no more than ordinary old-style pump and motor combinations.

For the whole story of *all* the extra-value, cost-cutting features you get in the new Electrifugal Pump, call the Allis-Chalmers district office. Or write Allis-Chalmers, Milwaukee, for Bulletin B-6140-1.

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